US EPA ~ APPROVED

TOTAL MAXIMUM DAILY LOAD (TMDL)
FOR THE
UPPER PECOS RIVER WATERSHED
[SANTA ROSA RESERVOIR TO HEADWATERS]

SEPTEMBER 25, 2013

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***COVER PHOTO**: Pecos River at Parker Avenue above El Rito Creek, June 2010.*

LIST OF ABBREVIATIONS

4Q3	4-Day, 3-year low-flow frequency
BMP	Best management practices
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CGP	Construction general storm water permit
CWA	Clean Water Act
^{o}C	Degrees Celcius
^{o}F	Degrees Farenheit
HUC	Hydrologic unit code
$j/m^2/s$	Joules per square meter per second
km^2	Square kilometers
LA	Load allocation
lbs/day	Pounds per day
mgd	Million gallons per day
mg/L	Milligrams per Liter
mi^2	Square miles
mL	Milliliters
MOS	Margin of safety
MOU	Memorandum of Understanding
MS4	Municipal separate storm sewer system
MSGP	Multi-sector general storm water permit
NM	New Mexico
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint source
QAPP	Quality Assurance Project Plan
RFP	Request for proposal
SEE	Standard Error of the Estimate
SWPPP	Storm water pollution prevention plan
SWQB	Surface Water Quality Bureau
TMDL	Total Maximum Daily Load
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WLA	Waste load allocation
WQCC	Water Quality Control Commission
WQS	Water quality standards (NMAC 20.6.4 as amended through August 31, 2007)
WBP	Watershed-based plan
WWTP	Wastewater treatment plant

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EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to develop Total Maximum Daily Load (TMDL) management plans for water bodies determined to be water quality limited. A TMDL details the amount of a pollutant a waterbody can assimilate without violating a state's water quality standards. It also allocates that load capacity to known point sources and nonpoint sources at a given flow. TMDLs are defined in 40 Code of Federal Regulations Part 130 as the sum of the individual Waste Load Allocations (WLAs) for point sources and Load Allocations (LAs) for nonpoint source and background conditions. TMDLs also include a Margin of Safety (MOS).

The Surface Water Quality Bureau (SWQB) conducted a water quality survey of the Upper Pecos Basin of north-central New Mexico in 2010. Water quality monitoring stations were located within the watershed to evaluate the impact of tributary streams and ambient water quality conditions. As a result of assessing data generated during this monitoring effort, impairment determinations of New Mexico water quality standards include the following:

- BACTERIA (*E. coli*) in Pecos Arroyo (Gallinas River to headwaters), Pecos River (Santa Rosa Reservoir to Tecolote Creek), and El Rito (Pecos River to headwaters)
- SPECIFIC CONDUCTANCE in Dalton Canyon Creek (Pecos River to headwaters), Falls Creek (Tecolote Creek to headwaters), Macho Canyon Creek (Pecos River to headwaters), and Willow Creek (Pecos River to headwaters).

Temperature TMDLs were developed in 2005 for Bull Creek, Cow Creek, and portions of the Gallinas and Pecos Rivers; Bull Creek is no longer impaired for temperature but Cow Creek, Gallinas River, and Pecos River remain impaired for temperature. TMDLs for turbidity were also developed in 2005 for Cow Creek and portions of Pecos River; all three turbidity impairments were removed from the 2012-2014 Integrated CWA §303(d)/305(b) List.

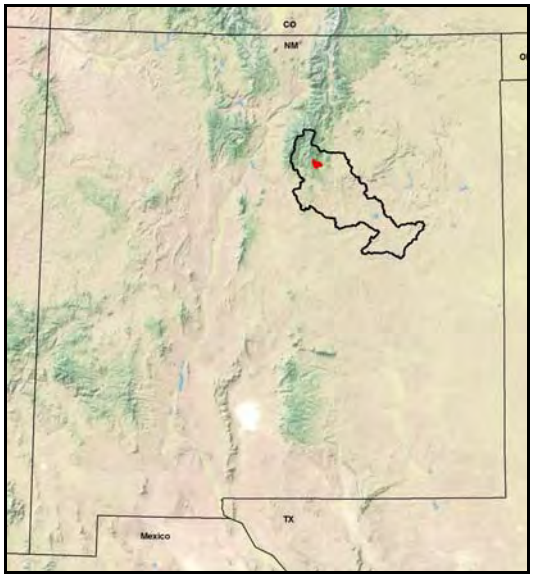
This TMDL document addresses the above noted impairments as summarized in the tables below. Data used to develop this TMDL were collected during the 2010 Upper Pecos survey. The 2010 study identified other potential water quality impairments that are not addressed in this document. Additional data needs for verification of those impairments and TMDL development are being identified and data collection will follow. If the impairments are verified, subsequent TMDLs will be prepared in a separate TMDL document.

The SWQB's Monitoring, Assessment, and Standards Section will collect water quality data during the next rotational cycle. The next scheduled monitoring date for the Upper Pecos Watershed is 2018 at which time TMDL targets will be re-examined and potentially revised as this document is considered to be an evolving management plan. In the event that new data indicate that the targets used in this analysis are not appropriate and/or if new standards are adopted, the load capacity will be adjusted accordingly. The SWQB's Watershed Protection Section will continue to work with watershed groups to develop Watershed-Based Plans to implement strategies that attempt to correct the water quality impairments detailed in this document. Implementation of items detailed in the Watershed-Based Plans will be done with participation of all interested and affected parties.

TOTAL MAXIMUM DAILY LOAD FOR
DALTON CANYON CREEK (PECOS RIVER TO HEADWATERS)

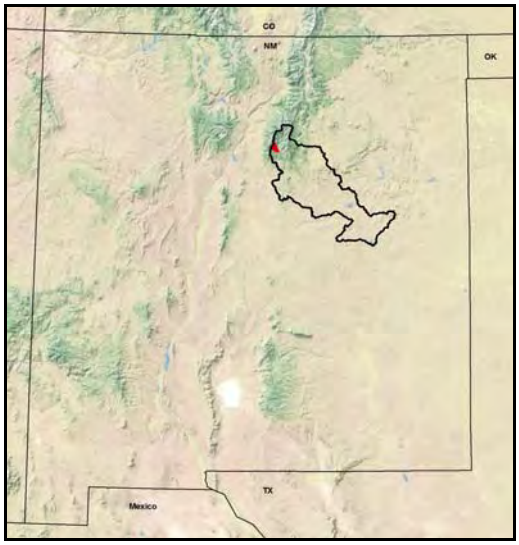
New Mexico Standards Segment	20.6.4.217
Waterbody Identifier	NM-2214.A_070
Segment Length	8 miles
Parameters of Concern	Specific conductance
Uses Affected	High Quality Coldwater Aquatic Life
Geographic Location	Pecos Headwaters USGS Hydrologic Unit Code 13060001
Scope/size of Watershed	14.5 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	98% forest and 2% grassland
Probable Sources	Pavement/impervious surfaces, inappropriate waste disposal, bridges/culverts/RR crossings, paved roads, gravel or dirt roads, highway/road/bridge runoff, angling pressure, dumping/garbage/trash/litter, dispersed campgrounds, drought-related impacts, watershed runoff following forest fire, on-site treatment systems, residences.
Land Management	99.6% USFS and <1% private
IR Category	5/5A
Priority Ranking	High
TMDL for: Specific conductance	**WLA + LA + MOS = TMDL** 0 + 327.7 + 57.83 = 385.6 lbs/day

TOTAL MAXIMUM DAILY LOAD FOR
FALLS CREEK (TECOLOTE CREEK TO HEADWATERS)



New Mexico Standards Segment	20.6.4.215
Waterbody Identifier	NM-2212_12
Segment Length	6.15 miles
Parameters of Concern	Specific conductance
Uses Affected	High Quality Coldwater Aquatic Life
Geographic Location	Pecos Headwaters USGS Hydrologic Unit Code 13060001
Scope/size of Watershed	12.8 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	82% forest, 14% grassland, and 4% shrubland
Probable Sources	Pavement/impervious surfaces, bridges/culverts/RR crossings, gravel or dirt roads, highway/road/bridge runoff, wildlife other than waterfowl, rangeland grazing.
Land Management	59% USFS, 36% private, and 5% State
IR Category	5/5A
Priority Ranking	High
TMDL for: Specific conductance	**WLA + LA + MOS = TMDL** 0 + 88.90 + 15.69 = 104.6 lbs/day

TOTAL MAXIMUM DAILY LOAD FOR
MACHO CANYON CREEK (PECOS RIVER TO HEADWATERS)

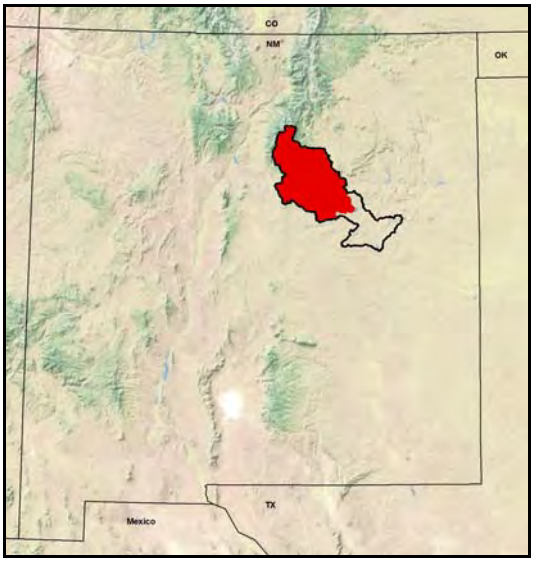


New Mexico Standards Segment	20.6.4.217
Waterbody Identifier	NM-2214.A_071
Segment Length	7.82 miles
Parameters of Concern	Specific conductance
Uses Affected	High Quality Coldwater Aquatic Life
Geographic Location	Pecos Headwaters USGS Hydrologic Unit Code 13060001
Scope/size of Watershed	12.1 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	99% forest and <1% grassland
Probable Sources	Rangeland grazing, pavement/impervious surfaces, bridges/culverts/RR crossings, paved roads, gravel or dirt roads, channelization, highway/road/bridge runoff, stream channel incision, drought-related impacts, wildlife other than waterfowl, on-site treatment systems, residences.
Land Management	94% USFS and 6% Private
IR Category	5/5A
Priority Ranking	High
TMDL for: Specific conductance	**WLA + LA + MOS = TMDL** 0 + 418.8 + 73.91 = 492.7 lbs/day

TOTAL MAXIMUM DAILY LOAD FOR
PECOS ARROYO (GALLINAS RIVER TO HEADWATERS)

New Mexico Standards Segment	20.6.4.221
Waterbody Identifier	NM-2213_22
Segment Length	4.53 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary contact
Geographic Location	Pecos Headwaters USGS Hydrologic Unit Code 13060001
Scope/size of Watershed	93.4 square miles
Land Type	Southwestern Tablelands (Ecoregion 26)
Land Use/Cover	73% grasslands, 16% forest, 9% shrubland, 2% residential and open water
Probable Sources	Rangeland grazing, bridges/culverts/RR crossings, gravel or dirt roads, channelization, highway/road/bridge runoff, dumping/garbage/trash/litter, surface films/odors, stream channel incision, on-site treatment systems, residences.
Land Management	99% Private, <1% USFS, and <1% State
IR Category	5/5A
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** 0 + 5.2×10^{8} + 2.73×10^{7} = 5.47×10^{8} cfu/day

TOTAL MAXIMUM DAILY LOAD FOR
PECOS RIVER (SANTA ROSA RESERVOIR TO TECOLOTE CREEK)

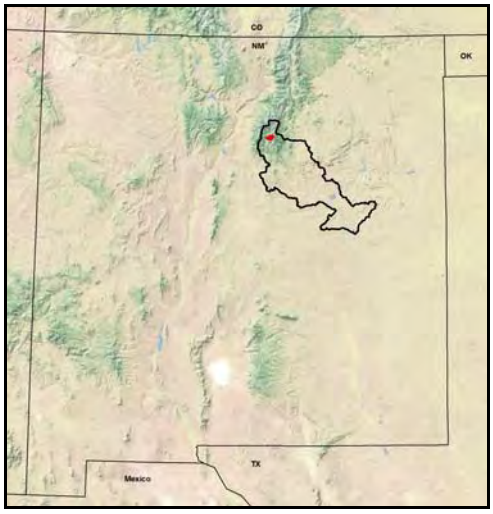


New Mexico Standards Segment	20.6.4.211
Waterbody Identifier	NM-2211.A_10
Segment Length	51.7 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary contact
Geographic Location	Pecos Headwaters USGS Hydrologic Unit Code 13060001
Scope/size of Watershed	2477 square miles
Land Type	Southwestern Tablelands (Ecoregion 26)
Land Use/Cover	59% grassland, 33% forest, and 8% shrubland
Probable Sources	Rangeland grazing, low water crossing, paved roads, gravel or dirt roads, dredging, irrigation return drains, highway/road/bridge runoff, dumping/garbage/trash/litter, crop production, on-site treatment.
Land Management	69% Private, 24% USFS, 5% State, <1% BLM, and <1% USFWS
IR Category	5/5A
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** 0 + 2.34×10^{10} + 1.23×10^{9} = 2.46×10^{10} cfu/day

TOTAL MAXIMUM DAILY LOAD FOR
EL RITO (PECOS RIVER TO HEADWATERS)

New Mexico Standards Segment	20.6.4.212
Waterbody Identifier	NM-9000.A_050
Segment Length	3.19 miles
Parameters of Concern	*E. coli*
Uses Affected	Primary contact
Geographic Location	Pecos Headwaters USGS Hydrologic Unit Code 13060001
Scope/size of Watershed	44.3 square miles
Land Type	Southwestern Tablelands (Ecoregion 26)
Land Use/Cover	95% grassland, 3% shrubland, and 2% developed
Probable Sources	Inappropriate waste disposal, municipal point source discharge, bridges/culverts/RR crossings, paved roads, gravel or dirt roads, angling pressure, dumping/garbage/trash/litter, surface films/odors, stream channel incision, waterfowl, on-site treatment systems, pavement/impervious surfaces, residences, land development.
Land Management	95% Private and 5% State
IR Category	5/5C
Priority Ranking	High
TMDL for: *E. coli*	**WLA + LA + MOS = TMDL** $3.20 \times 10^{9} + 6.69 \times 10^{7} + 1.72 \times 10^{8} = 3.44 \times 10^{9}$ cfu/day

TOTAL MAXIMUM DAILY LOAD FOR
WILLOW CREEK (PECOS RIVER TO HEADWATERS)



New Mexico Standards Segment	20.6.4.217
Waterbody Identifier	NM-2114.A_030
Segment Length	5.26 miles
Parameters of Concern	Specific conductance
Uses Affected	High Quality Coldwater Aquatic Life
Geographic Location	Pecos Headwaters USGS Hydrologic Unit Code 13060001
Scope/size of Watershed	8.0 square miles
Land Type	Southern Rockies (Ecoregion 21)
Land Use/Cover	98% forest and 2% grassland
Probable Sources	Rangeland grazing, pavement/impervious surfaces, RCRA site, bridges/culverts/RR crossings, paved roads, channelization, highway/road/bridge runoff, stream channel incision, wildlife other than waterfowl, abandoned mine/inactive tailings, active mine reclamation, gravel or dirt roads.
Land Management	92% USFS and 8% Private
IR Category	5/5A
Priority Ranking	High
TMDL for: Specific conductance	**WLA + LA + MOS = TMDL** 0 + 2194 + 387.2 = 2581 lbs/day

1.0 INTRODUCTION

Under Section 303 of the federal Clean Water Act (CWA), states establish water quality standards, which are submitted and subject to the approval of the U.S. Environmental Protection Agency (USEPA). Under Section 303(d)(1) of the CWA, states are required to develop a list of waters within a state that are impaired and establish a total maximum daily load (TMDL) for each pollutant. A TMDL is defined as "*a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standard including consideration of existing pollutant loads and reasonably foreseeable increases in pollutant loads*" (USEPA 1999). A TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's water quality standards. It also allocates that load capacity to known point sources and nonpoint sources at a given flow. TMDLs are defined in 40 Code of Federal Regulations (CFR) Part 130 as the sum of the individual Waste Load Allocations (WLAs) for point sources and Load Allocations (LAs) for nonpoint sources and natural background conditions." TMDLs also include a margin of safety (MOS). This document provides TMDLs for stream segments within the Upper Pecos watershed that have been determined to be impaired based on a comparison of measured concentrations and conditions with numeric water quality criteria or with numeric translators for narrative standards.

This document is divided into several sections. **Section 2.0** provides background information on the location and history of the Upper Pecos Watershed, provides applicable water quality standards for the assessment units addressed in this document, and briefly discusses the intensive water quality survey that was conducted in the Upper Pecos Watershed in 2010. **Section 3.0** provides *E. coli* TMDLs and **Section 4.0** contains specific conductance TMDLs. Pursuant to CWA Section 106(e)(1), **Section 5.0** provides a monitoring plan in which methods, systems, and procedures for data collection and analysis are discussed. **Section 6.0** discusses implementation of TMDLs (phase two) and the relationship between TMDLs and Watershed-Based Plans (WBPs). **Section 7.0** discusses assurance, **Section 8.0** public participation in the TMDL process, and **Section 9.0** provides references.

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2.0 UPPER PECOS WATERSHED CHARACTERISTICS

The Upper Pecos River was sampled by the Surface Water Quality Bureau (SWQB) from April to December 2010 (NMED/SWQB, 2013). Surface water quality monitoring stations were selected to characterize water quality of perennial stream reaches of the Pecos River and its tributaries. Information regarding previous sampling efforts by SWQB in the Upper Pecos River watershed is detailed in the Water Quality Survey Summaries for the Upper Pecos River Watershed (NMED/SWQB, 2004) available on the SWQB website. A number of water quality impairments identified during this survey are addressed in this document.

2.1 Location Description

The Pecos Headwaters watershed (US Geological Survey [USGS] Hydrologic Unit Code [HUC] 13060001) is located in north central NM and originates in the Sangre de Cristo Mountains. The entire Pecos Headwaters watershed encompasses approximately 4,276 square miles and extends over portions of six counties including Guadalupe, San Miguel, Santa Fe, Mora, Quay, and De Baca. The Pecos Headwaters includes the main stem of the Pecos River between Ft Sumner Reservoir and the headwaters, as well as tributaries that enter the Pecos River in that reach. As presented in **Figure 2.1**, land use is 55% rangeland and 44% forest. **Figure 2.2** shows ownership as 74% private, 18% US Forest Service, 6% State, 1% BLM, and less than 1% National Park Service and U.S. Fish and Wildlife. The upper Pecos River watershed is located in Omernik Level III Ecoregion 21 (Southern Rockies). According to the New Mexico Incident Management Team, the Tres Lagunas fire burned 10,219 acres north of Pecos during May 30-June 15, 2013. **Appendix E** includes the final incident report on the fire. The Jarosa Fire burned 11,149 acres in the Upper Pecos watershed from June 10 – July 5, 2013.

Numerous species within this watershed are listed as either threatened or endangered by both State and Federal agencies. State and Federally listed endangered and threatened species of particular interest due to reliance on aquatic and riparian habitat in the watershed include the Mexican tetra (extirpated within the range of this survey), Pecos bluntnose shiner (extirpated within the range of this survey), Rio Grande silvery minnow (extirpated in the Pecos), bigscale logperch, piping plover, brown pelican, white-tailed ptarmigan, boreal owl, Mexican spotted owl, southwestern willow flycatcher, gray vireo, Pecos sunflower, Holy Ghost ipomopsis, least shrew, wood lily, and large yellow lady's-slipper.
(http://nhnm.unm.edu/query_bcd/bcd_watershed_query.php5).

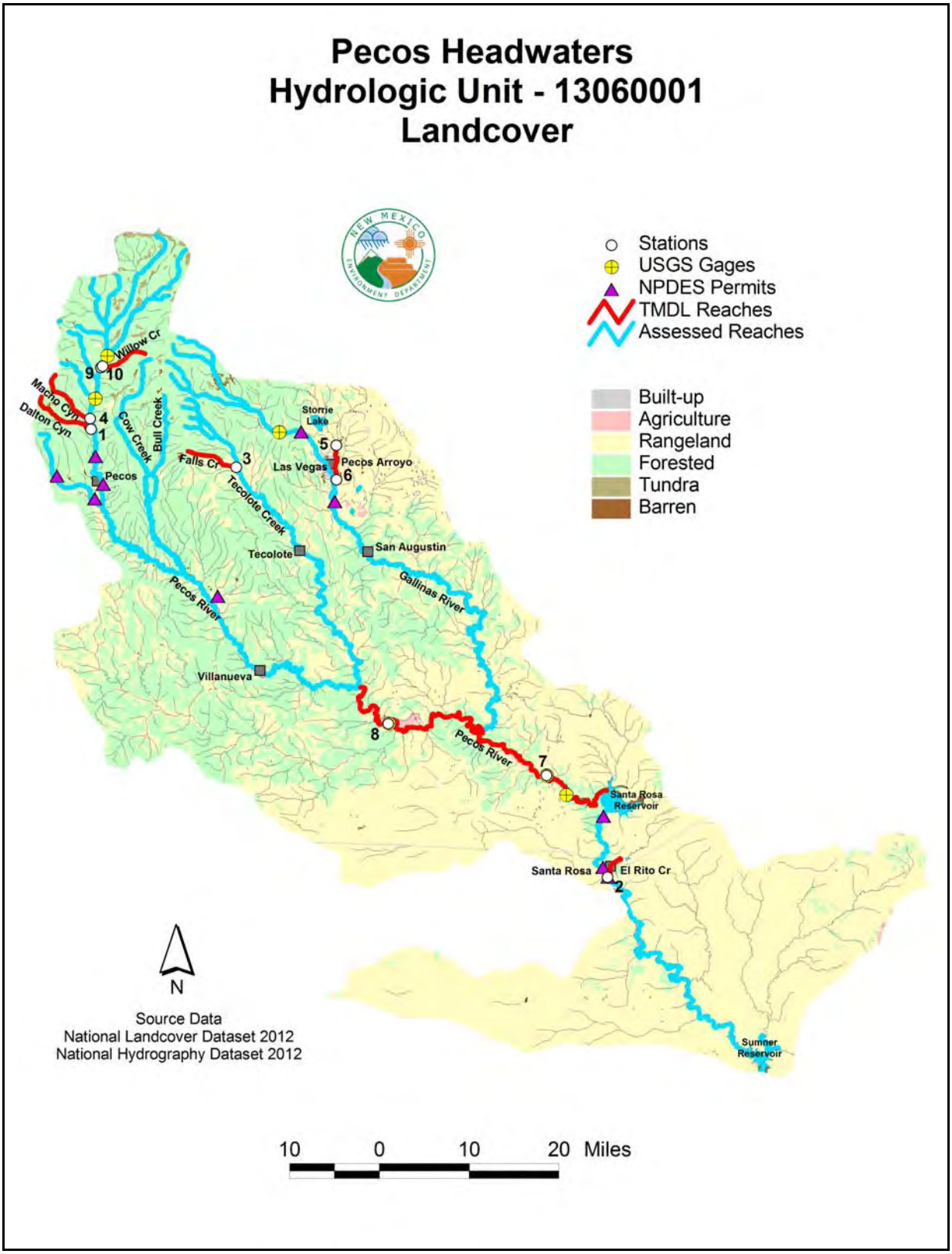

Figure 2.1 Land Use and 2010 Sampling Stations in the Upper Pecos Watershed. See Table 2.1 for station information.

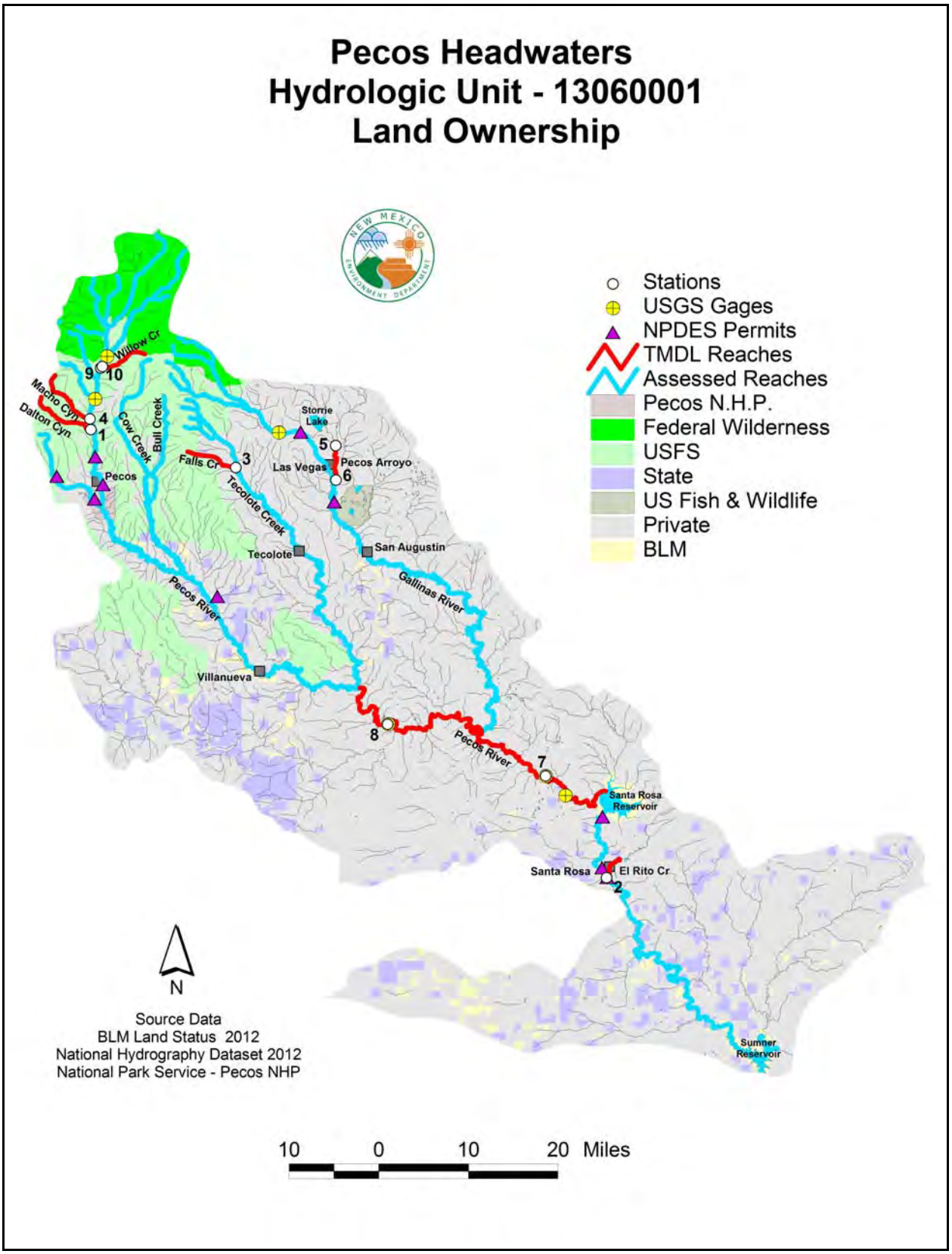

Figure 2.2 Land Management and 2010 Sampling Stations in the Upper Pecos Watershed

2.2 Geology

The geology of the Pecos Headwaters watershed consists of a complex distribution of Precambrian metamorphic rocks, Mesozoic sedimentary rocks, and Tertiary basalts (**Figure 2.3** and **Appendix D**). The Precambrian rocks (amphibolite, granite, gneiss, and mica schist) form the core of the Sangre de Cristo Mountains. However, the rest of the region is dominated by the sedimentary deposits that chronicle uplift of mountains during the Pennsylvanian, the subsequent erosion of these mountains, and the influx of a warm, shallow sea. These events resulted in the presence of the grey limestone of the San Andres formation, the light-tan Glorieta sandstone, and the brick-red siltstone and sandstone of the Yeso Formation. Pennsylvanian deposits are documented in the exposed layers of Dalton Bluff, near the Village of Pecos, where paleontologists have been able to study the fossiliferous layers and construct a reference assemblage for the region. The Permian gypsum and salt solutions in underlying rocks have created sinkholes in the Santa Rosa area and account for the snaking path of the Pecos River as it follows the curving line of collapsed caverns. The highway near Santa Rosa abruptly drops into the Santa Rosa Sink, one of the area's notable karst features, along with Blue Hole, a 60-foot diameter sink in the town of Santa Rosa. The Cretaceous Dakota Sandstone serves as an aquifer in the eastern portion of the watershed. The Chinle Formation is composed of red Triassic sandstone, siltstone, and a conglomerate that contains petrified wood and fossils of plants, invertebrates, and vertebrates. The Ogallala Formation consists of Miocene-Pliocene gravel washed eastward from the various mountain ranges, including the Rocky Mountains. The watershed consists of steep, narrow canyons north of Villanueva State Park and a broader valley south towards Santa Rosa (Hawley, et.al 1976).

The geology of the area has had impacts on the economic and cultural activity. Historical attempts were made to extract Early Pennsylvanian bituminous coal near the Village of Pecos as a result of these late Carboniferous depositions. Pecos National Monument contains ruins of a mission church and pueblo that use the surrounding clear gypsum from the Bernal Formation as windowpanes (Chronic 1987). Near Santa Rosa Lake, the late Triassic Santa Rosa sandstone includes tar sands that contain an estimated 90 million barrels of oil (Chronic, 1987). Placer gold was mined in the Sangre de Cristos as well as lead, zinc, and copper.

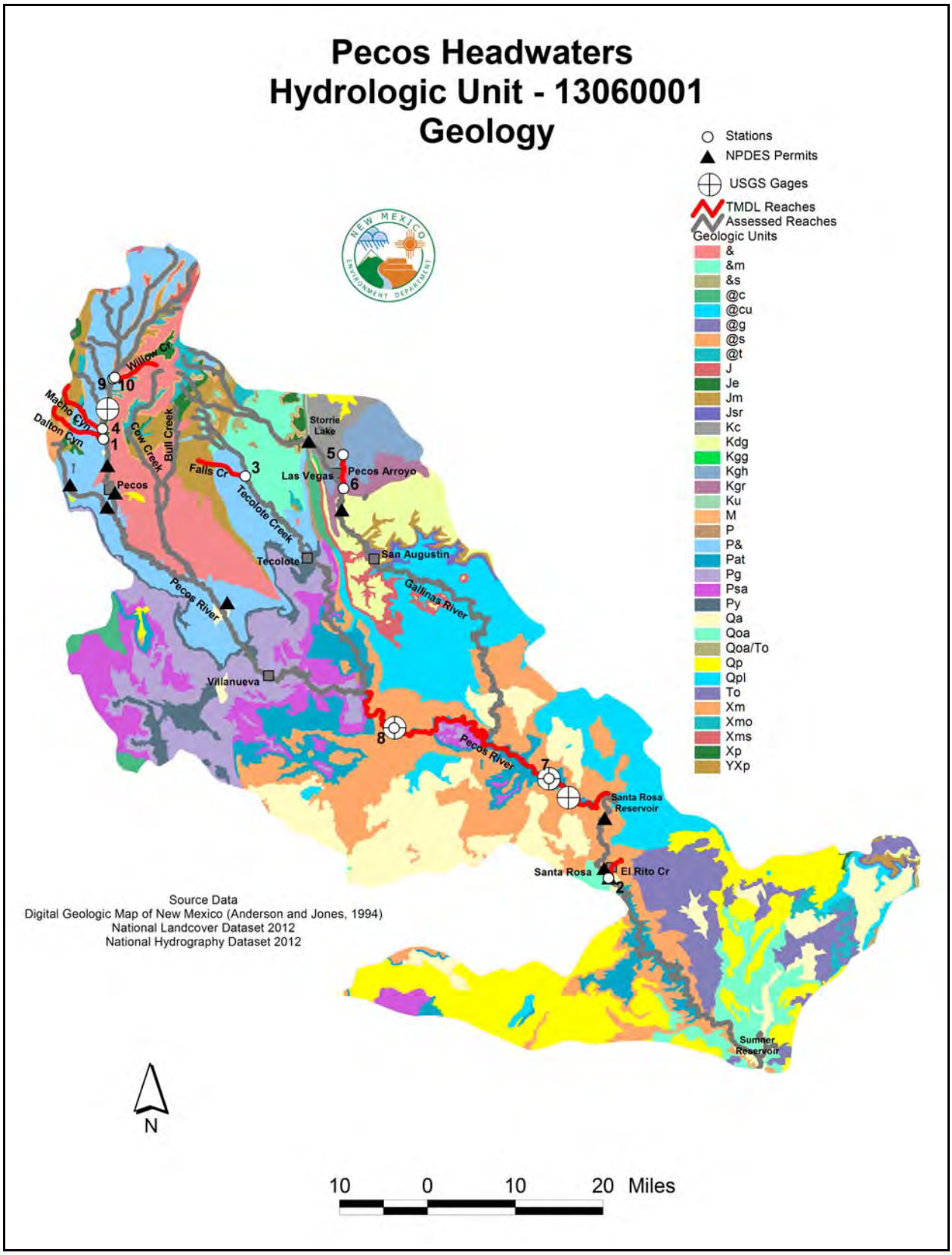

Figure 2.3 Geologic Map of the Upper Pecos Watershed and 2010 Sampling Stations

2.3 Water Quality Standards and Designated Uses

Water quality standards (WQS) for all assessment units in this document are set forth in sections, 206.4.211, 20.6.4.212, 20.6.4.215, 20.6.4.217, 20.6.4.221 of the *Standards for Interstate and Intrastate Surface Water s*, 20.6.4 New Mexico Administrative Code, as amended through November 20, 2012 (NMAC 2012). These standards have been approved by EPA for Clean Water Act purposes.

20.6.4.211 PECOS RIVER BASIN - The main stem of the Pecos river from the headwaters of Sumner reservoir upstream to Tecolote creek excluding Santa Rosa reservoir.

A. Designated Uses: fish culture, irrigation, marginal warmwater aquatic life, livestock watering, wildlife habitat and primary contact.

B. Criteria:

(1) The use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses.

(2) At all flows above 50 cfs: TDS 3,000 mg/L or less, sulfate 2,000 mg/L or less and chloride 400 mg/L or less.

[20.6.4.211 NMAC - Rp 20 NMAC 6.1.2211, 10-12-00; A, 05-23-05; A, 12-01-10; A, 07-10-12]

20.6.4.212 PECOS RIVER BASIN - Perennial tributaries to the main stem of the Pecos river from the headwaters of Sumner reservoir upstream to Santa Rosa dam.

A. Designated Uses: irrigation, coldwater aquatic life, livestock watering, wildlife habitat and primary contact.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criterion applies: temperature 25°C (77°F) or less.

[20.6.4.212 NMAC - Rp 20 NMAC 6.1.2211.1, 10-12-00; A, 05-23-05; A, 12-01-10]

20.6.4.215 PECOS RIVER BASIN - Perennial reaches of the Gallinas river and all its tributaries above the diversion for the Las Vegas municipal reservoir and perennial reaches of Tecolote creek and its perennial tributaries.

A. Designated Uses: domestic water supply, high quality coldwater aquatic life, irrigation, livestock watering, wildlife habitat, industrial water supply and primary contact; and public water supply on the Gallinas river.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: specific conductance 300 µS/cm or less (450 µS/cm or less in Wright Canyon creek); the monthly geometric mean of E. coli bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.

[20.6.4.215 NMAC - Rp 20 NMAC 6.1.2212, 10-12-00; A, 05-23-05; A, 12-01-10]

20.6.4.217 PECOS RIVER BASIN - Perennial reaches of Cow creek and all perennial reaches of its tributaries and the main stem of the Pecos river from Cañon de Manzanita upstream to its headwaters, including perennial reaches of all tributaries thereto except lakes identified in 20.6.4.222 NMAC.

A. Designated Uses: domestic water supply, fish culture, high quality coldwater aquatic life, irrigation, livestock watering, wildlife habitat and primary contact; and public water supply on the main stem of the Pecos river.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the

designated uses, except that the following segment-specific criteria apply: specific conductance 300 µS/cm or less; the monthly geometric mean of *E. coli* bacteria 126 cfu/100 mL or less, single sample 235 cfu/100 mL or less.
[20.6.4.217 NMAC - Rp 20 NMAC 6.1.2214, 10-12-00; A, 05-23-05; A, 12-01-10; A, 07-10-12]

20.6.4.221 PECOS RIVER BASIN - Pecos Arroyo.

A. Designated Uses: livestock watering, wildlife habitat, warmwater aquatic life and primary contact.

B. Criteria: the use-specific numeric criteria set forth in 20.6.4.900 NMAC are applicable to the designated uses, except that the following segment-specific criteria apply: the monthly geometric mean of E. coli bacteria 206 cfu/100 mL, single sample 940 cfu/100 mL.
[20.6.4.221 NMAC - N, 05-23-05; A, 12-01-10]

The numeric criteria identified in these sections are used for assessing waters for use attainability. The referenced Section 20.6.4.900 NMAC provides a list of water chemistry analytes for which SWQB tests and identifies numeric criteria for specific designated uses. In addition, waters are assessed against the narrative criteria identified in Section 20.6.4.13 NMAC, including bottom sediments and suspended or settleable solids, plant nutrients, and turbidity. The individual water quality criteria or narrative standards are detailed for each parameter in the chapters that follow.

Current impairment listings for the Upper Pecos Watershed are included in the 2012-2014 State of New Mexico Clean Water Act §303(d)/ §305(b) Integrated List (NMED/SWQB 2012a). The Integrated List is a catalog of assessment units (AUs) throughout the state with a summary of their current status as assessed/not assessed or impaired/not impaired. Once a stream AU is identified as impaired, a TMDL guidance document is developed for that segment with guidelines for stream restoration. Target values for TMDLs are determined based on 1) applicable numeric criteria or appropriate numeric translator to a narrative standard, 2) the degree of experience in applying various management practices to reduce a specific pollutant's loading, and 3) the ability to easily monitor and produce quantifiable and reproducible results. AU names and WQS have changed over the years and the history of these individual changes is tracked in the Record of Decision document associated with the 2012-2014 Integrated List available on the SWQB website.

NM's *Standards for Interstate and Intrastate Surface Waters* (20.6.4 NMAC) establish surface water quality standards that consist of designated uses of surface waters of the State, the water quality criteria necessary to protect the uses, and an antidegradation policy. NM's antidegradation policy, which is based on the requirements of 40 CFR 131.12, describes how waters are to be protected from degradation (Subsection A of 20.6.4.8 NMAC) while the *Antidegradation Policy Implementation Procedure*s establish the process for implementing the antidegradation policy (NMED/SWQB 2011b). At a minimum, the policy mandates that "the level of water quality necessary to protect the existing uses shall be maintained and protected in all surface waters of the state." In addition, whether or not a segment is impaired, the State's antidegradation policy requirements, as detailed in the *Antidegradation Policy Implementation Procedure* (NMED/SWQB 2011b), must be met. TMDLs are consistent with this policy because implementation of a TMDL restores water quality so that existing uses are protected and water

quality criteria are achieved. The *Antidegradation Policy Implementation Procedure* can be found in **Appendix A** of the *Statewide Water Quality Management Plan and Continuing Planning Process* document.

2.4 Water Quality Sampling

The Upper Pecos River Watershed was sampled by the SWQB in 2010. A brief summary of the survey and the hydrologic conditions during the sample period is provided in the following subsections. A more detailed description can be found in Upper Pecos Water Quality Survey Summary (NMED/SWQB 2013).

2.4.1 Survey Design

The Monitoring, Assessment, and Standards Section (MASS) of the SWQB conducted a water quality survey of the Upper Pecos watershed in 2010 between April and December. This water quality survey included 70 sampling sites as noted in the Upper Pecos Water Quality Survey Summary (NMED/SWQB 2013). Most sites were sampled 8 times, while some secondary sites were sampled one to four times. Monitoring these sites enabled an assessment of the cumulative influence of the physical habitat, water sources, and land management activities upstream from the sites. Data results from grab sampling are housed in the SWQB provisional water quality database and uploaded to USEPA's Water Quality Exchange (WQX) database. Sampling sites in **Figure 2.1** and highlighted in **Table 2.1** represent only those sites that are discussed in this document.

All temperature and chemical/physical sampling and assessment techniques are detailed in the *Quality Assurance Project Plan* (NMED/SWQB 2012b) and the SWQB assessment protocols (NMED/SWQB 2011). As a result of the 2010 monitoring effort and subsequent assessment of results, several surface water impairments were determined. Accordingly, these impairments were added to New Mexico's Integrated CWA §303(d)/305(b) List in 2012 (NMED/SWQB 2012a).

Table 2.1 SWQB 2010 Upper Pecos Basin Sampling Stations

Station #	Station Description	STORET/ WQX ID
1	Dalton Canyon Creek 20m west of Hwy 63 bridge	50Dalton000.1
2	El Rito Creek downstream of Santa Rosa WWTF	50ElRito000.2
3	Falls Cr. at CR A 19A	50FallsC000.1
4	Macho Canyon Creek 10m west of Hwy 63 bridge	50MachoC000.2
5	Pecos Arroyo @ Harris Lk. abv. Spring Arroyo	50PecosA007.9
6	Pecos Arroyo above the Gallinas River	50PecosA000.3
7	Pecos River at gage near Colonias	50PecosR601.2

Station #	Station Description	STORET/ WQX ID
8	Pecos River near Anton Chico at gage # 8379500	50PecosR651.0
9	Willow Creek below White Drain	50Willow000.1
10	Willow Creek abv Fish Barrier	50Willow000.6

2.4.2 Hydrologic Conditions

There are four active USGS gaging stations on the portion of the Pecos River encompassed in this survey, as well as a gage on the Rio Mora and gages on the Gallinas River with periods of record from 1910 to present day. As described in the following sections, USGS gage 08382650 was used (when appropriate) in flow calculations in the TMDLs due to its location in the watershed. The mean daily discharge for this gage was 125 cfs in 2010. **Figure 2.4** displays the mean discharge for 2010 and **Figure 2.5** displays the mean discharge for the period of record.

Table 2.2 USGS gages in the Upper Pecos Watershed (HUC 13060001)

Agency	Site Number	Site Name	Period of Record
USGS	08378500	Pecos River near Pecos, NM	1919-present
USGS	08379500	Pecos River nea Anton Chico, NM	1910-present
USGS	08382600	Pecos River abv Canon de Uta near Colonias	1976-present
USGS	08382650	Pecos River abv Santa Rosa Reservoir	1976-present

As stated in the Assessment Protocol (NMED/SWQB 2011), data collected during all flow conditions, including low flow conditions (i.e., flows below 4-day, 3-year flows [4Q3]), will be used to determine designated use attainment status during the assessment process. For the purpose of assessing designated use attainment in ambient surface waters, WQS apply at all times under all flow conditions.

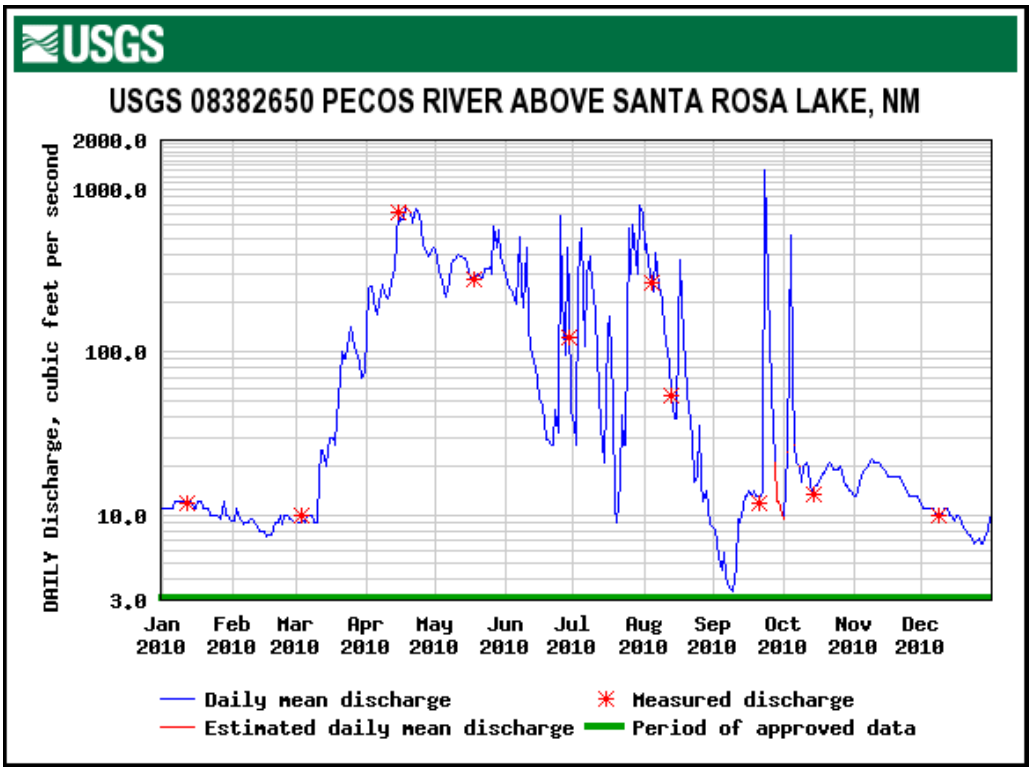

Figure 2.4 Daily mean discharge for the Pecos River above Santa Rosa Lake, NM (2010)

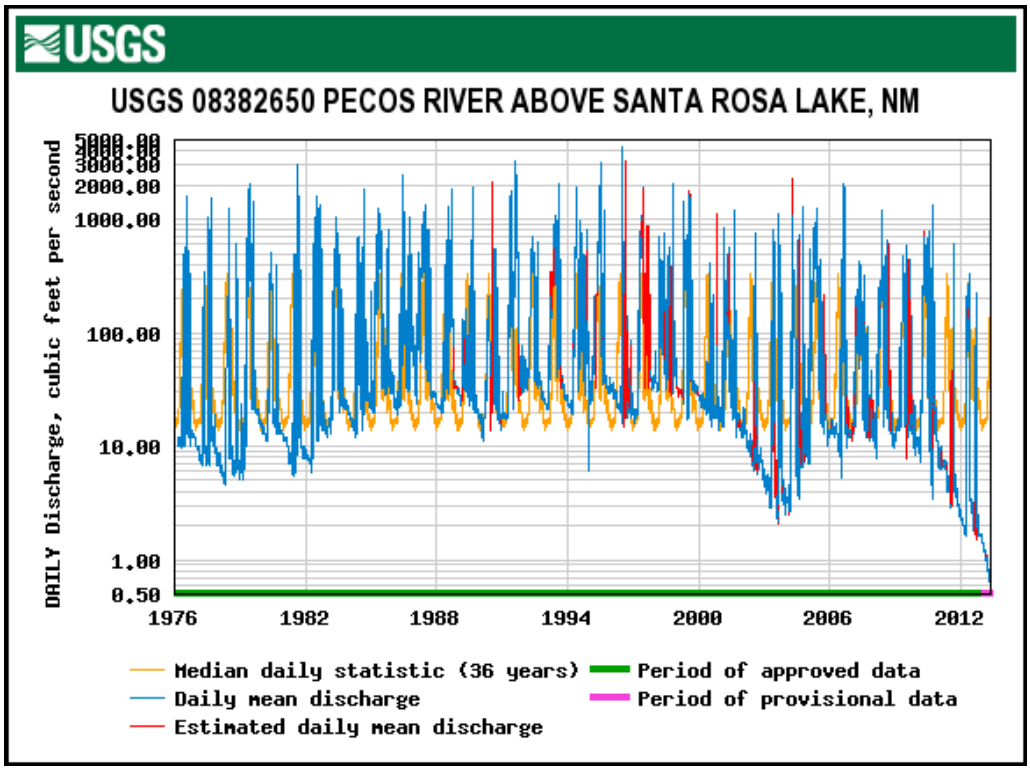

Figure 2.5 Daily mean discharge for the Pecos River above Santa Rosa Lake, NM (1976 – 2013)

3.0 BACTERIA

Assessment of data from the 2010 SWQB water quality survey in the Upper Pecos River watershed identified exceedences of the numeric criteria of New Mexico water quality standards for *E. coli* bacteria in El Rito, Pecos Arroyo, and Pecos River (Santa Rosa Reservoir to Tecolote Creek).

As a result, these assessment units were listed on the Integrated CWA §303(d)/§305(b) List with *E. coli* as a pollutant of concern (NMED/SWQB 2010b). If and when water quality criteria have been met, the reach will be moved to the appropriate category on the Clean Water Act Integrated §303(d)/§305(b) List of assessed waters.

3.1 Target Loading Capacity

For this TMDL document, target values for bacteria are based on the reduction in bacteria necessary to meet numeric criteria for the primary contact designated use in 20.6.4.900 NMAC of 126 cfu/100 mL *E. coli* geometric mean and 410 cfu/100 mL *E. coli* single sample except for the segment specific criteria in 20.6.4.221 of 206 cfu/100 mL *E. coli* geometric mean and the *E. coli* single sample criteria of 940 cfu/100 mL.

The presence of *E. coli* bacteria is an indicator of the possible presence of other pathogens that may limit beneficial uses and present human health concerns. Exceedences for each assessment unit are presented in **Table 3.1** and *E. coli* data are in **Appendix C**.

Table 3.1 *E. coli* exceedences

Assessment Unit	WQS Segment	Associated Criterion* (cfu/100mL)	Exceedence Ratio (# exceedences / total # samples)
El Rito Creek	20.6.4.212	410	2/5
Pecos Arroyo	20.6.4.221	940	2/10
Pecos River (Santa Rosa Res to Tecolote Creek)	20.6.4.211	410	4/23

Notes: * = single sample criterion
cfu = colony forming units
mL = milliliters

3.2 Flow

TMDLs are calculated at a specific flow and bacteria concentrations can vary as a function of flow. SWQB determined streamflow either by using the active USGS gage network or by taking direct in-stream flow measurements utilizing standard procedures (NMED/SWQB, 2010a). Water quality standard exceedences for all impaired reaches occurred during low and moderate flows. Therefore, for these reaches, the critical flow value used to calculate the TMDLs was obtained using a 4-day, 3-year low-flow frequency (4Q3) regression model. The 4Q3 is the annual lowest 4 consecutive day flow that occurs with a frequency of at least once every 3 years. According to the New Mexico Water Quality Standards, the low flow critical condition is

defined as 4Q3 (NMAC 20.6.4.11.B.2). Critical low flow was determined on an annual basis utilizing all available daily flow values rather than on a seasonal basis for these TMDLs because exceedences occurred across both low and high flow conditions.

When available, USGS gages are used to estimate the critical flow. There are four Pecos River gages that were active in the Upper Pecos Watershed around the time of the water quality survey and data collection efforts (**Table 2.2**) as well as a gage on the Rio Mora and gages on the Gallinas River. The 4Q3 flow for Pecos River (Santa Rosa Res to Tecolote Creek) was estimated using the appropriate gage data and DFLOW software, Version 3.1b (USEPA 2006). DFLOW 3.1b is a Windows-based tool developed to estimate user selected design stream flows for low flow analysis by utilizing algorithms based on Log Pearson Type III distribution.

A climatic year starting April 1 of the prior year and ending March 31 is often used when examining critical low flow conditions in the United States. This choice reduces the likelihood of splitting low flow periods - typically found in the summer or fall - across different years and thereby affecting the results of Log Pearson Type III analysis of series of annual low flows. A different climatic year or shorter season may be used if low flow periods occur at other times of the year or overlap the boundaries of the climatic year.

The calculated 4Q3 using DFLOW software is:

- Pecos River (Santa Rosa Res to Tecolote Creek) = 7.97 cfs (5.15 mgd)

In the case of ungaged streams an analysis method developed by Waltemeyer (2002) can be used to estimate flow. In Waltemeyer's analysis, two regression equations for estimating 4Q3 were developed based on physiographic regions of NM (i.e., statewide and mountainous regions above 7,500 feet in elevation). 4Q3 derivations for ungaged streams were based on analysis methods described by Waltemeyer (2002). Two regression equations for estimating 4Q3 were developed based on physiographic regions of New Mexico (i.e., statewide and mountainous regions above 7,500 feet in elevation). The decision to use the statewide versus the mountainous equation is based on the average elevation of the assessment unit. The 4Q3s for El Rito Creek and Pecos Arroyo were estimated using the statewide regression equation regions (Eq. 3-1) because the mean elevations for these assessment units were less than 7,500 feet in elevation (**Table 3.2**). The following statewide regression equation is based on data from 50 gaging stations with nonzero discharge (Waltemeyer 2002):

$$4Q3 = 1.2856 \times 10^{-4}\ DA^{0.42}\ P_w^{3.16} \qquad \text{(Eq. 3-1)}$$

where,

4Q3 = Four-day, three-year low-flow frequency (cfs)
DA = Drainage area (mi^2)
P_w = Average basin mean winter precipitation (inches)

The average standard error of the estimate (SEE) and coefficient of determination are 94 and 66 percent, respectively, for this regression equation (Waltemeyer, 2002).

Table 3.2 Calculation of 4Q3 Low-Flow Frequencies

Assessment Unit	Average Elevation (ft.)	Drainage Area (mi^2)	Mean Winter Precipitation (in.)	Average Basin Slope (percent)	4Q3 (cfs)	4Q3 (mgd)
El Rito Creek	4865	44.34	4.58	2.3	0.08	0.05
Pecos Arroyo	6742	93.44	4.55	5.5	0.10	0.07

USGS gage data from the Pecos River (08378500) indicate that stream flow was above average during the survey period. This was the result of a relatively deep snow pack which, together with rapid temperature increases in the spring, produced high flows during spring runoff. Later periods of elevated discharge were caused by heavy thunderstorm activity in the summer and early fall (NMED/SWQB 2013). However, low and moderate flow conditions were noted for the sampling events, so for this reason the SWQB decided to use the more conservative 4Q3 values calculated using Equation 3-1 and presented in **Table 3.2** as well as USGS gage data. Additionally, as noted in **Table 3.2**, the design capacity flow was added to the calculated 4Q3 flow for El Rito Creek.

The critical streamflow values were converted from cubic feet per second (cfs) to units of million gallons per day (mgd) as follows:

$$\_\_\_\_\_ \frac{ft^3}{\text{sec}} \times 1{,}728 \frac{in^3}{ft^3} \times 0.004329 \frac{gal}{in^3} \times 86{,}400 \frac{\text{sec}}{day} \times 10^{-6} = \_\_\_\_\_ mgd \qquad \text{(Eq. 3-2)}$$

It is important to remember that the TMDL itself is a value calculated at a defined critical condition, and is calculated as part of planning process designed to meet water quality standards. Since flows vary throughout the year in these systems, the actual load at any given time will vary based on the changing flow. Management of the load to improve stream water quality should be a goal to be attained. Meeting the calculated TMDL may be a difficult objective.

3.3 Calculations

Bacteria criteria are expressed as colony forming units (cfu) per unit volume. The *E. coli* criteria used to calculate the allowable stream loads for the impaired assessment units are listed in **Table 3.3**. Target loads for bacteria are calculated based on flow values, water quality standards, and a conversion factor (Equation 3-3). The more conservative monthly geometric mean criteria are utilized in TMDL calculations to provide an implicit MOS. Furthermore, if the single sample criteria were used as targets, the geometric mean criteria may not be met.

*C as cfu/100 mL * 1,000 mL/1 L * 1 L/ 0.264 gallons * Q in 1,000,000 gallons/day = cfu/day* (Eq. 3-3)

Where C = the water quality criterion for bacteria,
Q = the critical stream flow in million gallons per day (mgd)

Table 3.3 Calculation of TMDL for *E. coli*

Assessment Unit	Critical Flow (mgd)	*E. coli* geometric mean criteria (cfu/100mL)	Conversion Factor[(a)]	TMDL (cfu/day)
El Rito Creek (Gallinas River to headwaters)	0.72*	126	3.79×10^7	3.44×10^9
Pecos Arroyo (Pecos River to headwaters)	0.07	206	3.79×10^7	5.47×10^8
Pecos River (Santa Rosa Res to Tecolote Creek)	5.15	126	3.79×10^7	2.46×10^{10}

Notes: *(a)* Based on equation 3-2.
* Combined flow based on design flow of Santa Rosa WWTP (0.67 mgd) and 4Q3 of stream (0.05 mgd)

The measured loads for *E. coli* were similarly calculated. The arithmetic mean of the data used to determine the impairment was substituted for the criterion in Equation 3-3. The same conversion factor was used. The measured load was calculated using the arithmetic mean of the data. Because the arithmetic mean of a dataset is always greater than the geometric mean (Muirhead 1903), the arithmetic mean acts as a component of the implicit MOS. Results are presented in **Table 3.4**.

Table 3.4 Calculation of measured loads for *E. coli*

Assessment Unit	Critical Flow (mgd)	*E. coli* Arithmetic Mean[(a)] (cfu/100mL)	Conversion Factor[(b)]	Measured Load (cfu/day)
El Rito Creek (Gallinas River to headwaters)	0.72*	482	3.79×10^7	1.31×10^{10}
Pecos Arroyo (Pecos River to headwaters)	0.07	448	3.79×10^7	1.20×10^9
Pecos River (Santa Rosa Res to Tecolote Creek)	5.15	273	3.79×10^7	5.32×10^{10}

Notes: *(a)* The arithmetic mean of the available *E. coli* samples.
(b) Based on equation 3-3.
* Combined flow based on design flow of Santa Rosa WWTP (0.67 mgd) and 4Q3 of stream (0.05 mgd)

The samples collected and the impairment determinations are based on exceedences of the State's single sample criterion, and the TMDL is written to address the monthly geometric mean criteria. As such, any simple comparison of these numbers is fraught with challenge and, this case, will result in an over-estimation of the actual reduction necessary. Furthermore, neither Section 303 of the Clean Water Act nor Title 40, Part 130.7 of the Code of Federal Regulations requires states to include discussions of percent reductions in TMDL documents. Although NMED believes that it is often useful to discuss the magnitude of water quality exceedences in the TMDL, the "percent reduction" value can be calculated in multiple ways and as a result can often be misinterpreted. Therefore, a percent reduction is not presented for *E. coli*.

3.4 Waste Load Allocations and Load Allocations

3.4.1 Waste Load Allocation

There are no active point source dischargers on Pecos Arroyo or Pecos River (Santa Rosa Reservoir to Tecolote Creek). However, the City of Santa Rosa WWTP (NM0024988) discharges into El Rito before its confluence with the Pecos River. The permit issued in September 2011 includes *E. coli* effluent limits that reflect the *E. coli* criteria in 20.6.4.212. However, the City of Santa Rosa has a history of noncompliance of the *E. coli* effluent limits and a Consent Agreement and Final Order for Clean Water Act violations was issued to the City by EPA on March 2, 2012 for failure to meet effluent limitations for Biochemical Oxygen Demand, *E. coli*, and Total Suspended Solids at Outfall 001A. There are no Municipal Separate Storm Sewer System (MS4) storm water permits in these AUs.

Storm water discharges from construction activities are transient because they occur mainly during the construction itself, and then only during storm events. Coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for construction sites greater than one acre requires preparation of a Storm Water Pollution Prevention Plan (SWPPP) that includes identification and control of all pollutants associated with the construction activities to minimize impacts to water quality. The current CGP also includes state-specific requirements to implement site-specific interim and permanent stabilization, managerial, and structural solids, erosion, and sediment control Best Management Practices (BMPs) and/or other controls. BMPs are designed to prevent to the maximum extent practicable an increase in sediment load to the water body or an increase in a sediment-related parameter, such as total suspended solids, turbidity, siltation, stream bottom deposits, etc. BMPs also include measures to reduce flow velocity during and after construction compared to pre-construction conditions to assure that waste load allocations (WLAs) or applicable water quality standards, including the antidegradation policy, are met. Compliance with a SWPPP that meets the requirements of the CGP is generally assumed to be consistent with this TMDL.

Storm water discharges from active industrial facilities are generally covered under the current NPDES Multi-Sector General Permit (MSGP). This permit also requires preparation of an SWPPP, which includes specific requirements to limit (or eliminate) pollutant loading associated with the industrial activities in order to minimize impacts to water quality. Compliance with a SWPPP that meets the requirements of the MSGP is generally assumed to be consistent with this TMDL.

It is not possible to calculate individual WLAs for facilities covered by these General Permits at this time using the available tools. Discharges from these permits are typically transitory and enforcement is complex as permittees are temporary. Loads that are in compliance with the General Permits are therefore currently included as part of the load allocation (LA). However, excess bacteria concentrations may be a component of some storm water discharges covered under general NPDES permits, so the load for these dischargers should be addressed. While these sources are not given individual allocations, they are addressed through other means, including BMPs, stormwater pollution prevention conditions, and other requirements.

3.4.2 Load Allocation

In order to calculate the LA, the WLA and margin of safety (MOS) were subtracted from the target capacity TMDL following Equation 3-4:

$$WLA + LA + MOS = TMDL \quad \text{(Eq. 3-4)}$$

The MOS is estimated to be 5 percent of the target load calculated in **Table 3.3**. Results are presented in **Table 3.5**. Additional details on the MOS chosen are presented in **Section 3.7**.

The extensive data collection and analyses necessary to determine background *E. coli* loads for the Upper Pecos River watershed were beyond the resources available for this study, however this type of data collection could be appropriate for a future Bacteria Source Tracking study. It is therefore assumed that a portion of the LA is made up of natural background loads.

It is important to note that WLAs and LAs are estimates based on a specific flow condition. Under differing hydrologic conditions, the loads will change. Successful implementation of this TMDL will be determined based on achieving the *E. coli* standards.

Table 3.5 TMDL for *E. coli*

Assessment Unit	WLA (cfu/day)	LA (cfu/day)	MOS (5%) (cfu/day)	TMDL (cfu/day)
El Rito Creek (Gallinas River to headwaters)	3.20×10^{9} [(a)]	6.69×10^{7}	1.72×10^{8}	3.44×10^{9}
Pecos Arroyo (Pecos River to headwaters)	0	5.2×10^{8}	2.73×10^{7}	5.47×10^{8}
Pecos River (Santa Rosa Res to Tecolote Creek)	0	2.34×10^{10}	1.23×10^{9}	2.46×10^{10}

Notes: [(a)] See discussion in **Section 3.4.1**. WLA calculated using 0.67 mgd design flow.

SWQB often includes a table that displays the percent reduction necessary for each AU with a TMDL in this document. However, SWQB recognizes that for this TMDL calculating a percent reduction is particularly challenging. This is largely because the samples collected and the impairment determinations are based on exceedences of the State's single sample criterion and the TMDL is written to the address the monthly geometric mean standard. Therefore, SWQB will not include a table discussing the percent reduction necessary to meet the *E. coli* WQS.

3.5 Identification and Description of Pollutant Source(s)

SWQB fieldwork includes an assessment of the probable sources of impairment (**Appendix B**). The approach for identifying "Probable Sources of Impairment" was modified in 2010 by SWQB to include additional input from a variety of stakeholders including landowners, watershed groups, and local, state, tribal and federal agencies. Probable Source Sheets are filled out by SWQB staff during watershed surveys and watershed restoration activities. The draft probable source list will be reviewed and modified, as necessary, with watershed group/ stakeholder input during the TMDL public meeting and comment period.

The Probable Source Identification Sheets in **Appendix B** provide an approach for a visual analysis of a pollutant source along an impaired reach. Although this procedure is subjective, SWQB feels that it provides the best available information for the identification of probable sources of impairment in a watershed. The list of "Probable Sources" is not intended to single out any particular land owner or single land management activity and has therefore been labeled "Probable" and generally includes several sources for each impairment. **Table 3.6** displays probable sources of impairment along the reach as determined by field reconnaissance and assessment. Probable sources of *E. coli* will be evaluated, refined, and changed as necessary through the Watershed-Based Plan (WBP).

Table 3.6 Pollutant source summary for *E. coli*

Assessment Unit	Pollutant Sources	Magnitude[(a)] (cfu/day)	Probable Sources[(b)] (% from each)
El Rito Creek (Gallinas River to headwaters)	Point:	3.20×10^9	24% Municipal point source discharges.
	Nonpoint:	1.31×10^{10}	76% Inappropriate waste disposal, bridges/culverts/RR crossings, paved roads, gravel or dirt roads, angling pressure, dumping/garbage/trash/litter, surface films/odors, stream channel incision, waterfowl, on-site treatment systems, pavement/impervious surfaces, residences, land development.
Pecos Arroyo (Pecos River to headwaters)	Point:	n/a	0%
	Nonpoint:	1.20×10^9	100% Rangeland grazing, bridges/culverts/RR crossings, gravel or dirt roads, channelization, highway/road/bridge runoff, dumping/garbage/trash/litter, surface fims/odors, stream channel incision, on-site treatment systems, residences.
Pecos River (Santa Rosa Res to Tecolote Creek)	Point:	n/a	0%
	Nonpoint:	5.32×10^{10}	100% Rangeland grazing, low water crossing, paved roads, gravel or dirt roads, dredging, irrigation return drains, highway/road/bridge runoff, dumping/garbage/trash/litter, crop production, on-site treatment.

Notes:
(a) Measured Load (**Table 3.4**). *Point source* magnitude is based on the WLA calculation from NPDES permit (**Table 3.5**).
(b) This list of probable sources is based on staff observation and known land use activities in the watershed. These sources are not confirmed nor quantified at this time.

3.6 Linkage of Water Quality and Pollutant Sources

Among the probable sources of bacteria are municipal point source discharges such as wastewater treatment facilities, poorly maintained or improperly installed (or missing) septic tanks, livestock grazing of valley pastures and riparian areas, upland livestock grazing, in addition to wastes from pets, waterfowl, and other wildlife. Howell et. al. (1996) found that bacteria concentrations in underlying sediment increase when cattle (*Bos taurus*) have direct access to streams, such as the waters in the Upper Pecos River Watershed. Natural sources of bacteria are also present in the form of other wildlife such as elk, deer, and any other mammals and birds. In addition to direct input from grazing operations and wildlife, *E. coli* concentrations may be subject to elevated levels as a result of resuspension of bacteria laden sediment during storm events. Temperature can also play a role in bacteria concentrations. Howell et. al. (1996) observed that bacteria growth increases as water temperature increases, which has the potential to occur in this watershed as well.

The bacteria loading in the Upper Pecos River watershed probably originates from a combination of drought-related impacts, municipal point source discharges, and livestock and wildlife wastes. Habitat modifications such as loss of riparian habitat, road maintenance and runoff, and land development or redevelopment as well as other recreational pollution sources may also be important contributors of bacteria. E.coli exceedences can occur during low flows as well as following episodic rain events.

In order to determine exact sources and relative contributions, further study is needed. One method of characterizing sources of bacteria is a Bacterial, or Microbial, Source Tracking (BST) study. The extensive data collection and analyses necessary to determine bacterial sources were beyond the resources available for this study. While sufficient data currently exist to support development of *E. coli* TMDLs to address the stream standards exceedences, a BST dataset will likely prove useful in the future to better identify the sources of *E. coli* impacting the stream.

3.7 Margin of Safety

The CWA requires that each TMDL be calculated with a MOS. This statutory requirement that TMDLs incorporate a MOS is intended to account for uncertainty in available data or in the actual effect controls will have on loading reductions and receiving water quality. A MOS may be expressed as unallocated assimilative capacity or conservative analytical assumptions used in establishing the TMDL (e.g., derivation of numeric targets, modeling assumptions or effectiveness of proposed management actions). The MOS may be implicit, utilizing conservative assumptions for calculation of the loading capacity, WLAs, and LAs. The MOS may also be explicitly stated as an added separate quantity in the TMDL calculation.

- *Implicit Assumption*
  The measured load was calculated using the arithmetic mean of the data. Because the arithmetic mean of a dataset is always greater than the geometric mean (Muirhead 1903), the arithmetic mean acts as a component of the implicit MOS.

- *Conservative Assumptions*
  E. coli bacteria does not readily degrade in the environment.

  Using the monthly geometric mean criterion rather than the single sample criterion, which allows for higher concentrations in individual grab samples, to calculate target loading values.

- *Explicit recognition of potential errors*
  A 4Q3 flow value for these ungaged streams was estimated based on a regression equation from Waltemeyer (2002). There is inherent error in all flow calculations. A conservative MOS for this element is therefore **5 percent**.

3.8 Consideration of Seasonal Variation

Federal regulations (40 CFR §130.7(c)(1)) require that TMDLs take into consideration seasonal variation in watershed conditions and pollutant loading. Data used in the calculation of these TMDLs were collected during the spring, summer, and fall of 2010 in order to ensure coverage of any potential seasonal variation in the system. Bacteria exceedences occurred during both high and low flow events. Higher flows may flush more nonpoint source runoff containing bacteria. It is possible the criterion may be exceeded under a low flow condition when there is insufficient dilution.

3.9 Future Growth

Growth estimates by county are available from the New Mexico Bureau of Business and Economic Research. These estimates project growth to the year 2040. The Pecos Headwaters HUC extends over portions of six counties: Guadalupe, San Miguel, Santa Fe, Mora, Quay, and De Baca, however most of the HUC is within San Miguel and Guadalupe counties. The populations of San Miguel, Quay, and Mora Counties are projected to decrease by 3-10 percent over the 2010-2040 period. Guadalupe County is expected to grow 2.6 percent over the 2010-2040 period, whereas Santa Fe County expects a growth of 25 percent and De Baca County expects a 35 percent increase over the same 2010-2040 time period. None of the streams addressed in this document are in De Baca County and those located in Santa Fe County are in the wilderness areas and outside of the Santa Fe urban area.

According to the data, bacteria loading is primarily due to diffuse nonpoint sources. Estimates of future growth are not anticipated to lead to a significant increase in bacteria concentrations that cannot be controlled with best management practices (BMPs) in this watershed. However, it is imperative that BMPs continue to be utilized in this watershed to improve road conditions and grazing allotments and adhere to SWPPP requirements related to construction and industrial activities covered under the general permit.

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4.0 SPECIFIC CONDUCTANCE

During the 2010 SWQB intensive water quality survey, exceedences of the NM water quality criteria for Specific Conductance (SC) were documented in Dalton Canyon Creek, Falls Creek, Macho Canyon Creek, and Willow Creek. The following subsection presents the SC TMDL for this impaired assessment unit.

According to the NM WQS (20.6.4.215 and 20.6.4.217 NMAC), the standard for SC reads:

> *In any single sample: specific conductance 300 µmhos/cm or less. . .*

4.1 Target Loading Capacity

Target values for these SC TMDLs will be determined based on 1) the presence of numeric criteria, 2) the degree of experience in applying the indicator, and 3) the ability to easily monitor and produce quantifiable and reproducible results. For this TMDL document, target values for SC are based on the reduction in total dissolved solids (TDS) necessary to achieve numeric SC criteria. This TMDL is also consistent with New Mexico's antidegradation policy.

The NM Water Quality Control Commission (WQCC) has adopted a numeric water quality criterion for SC to protect the designated use of High Quality Coldwater Aquatic Life (HQCWAL). The water quality criterion has been set at a level to protect coldwater aquatic life. The HQCWAL use designation requires that a stream have water quality, streambed characteristics, and other attributes of habitat sufficient to protect and maintain HQCWAL. The primary standard leading to an assessment of use impairment is the numeric criteria for SC of 300 µmhos/cm.

4.2 Flow

SC in a stream can vary as a function of flow. As flow decreases, the concentration of total dissolved solids (TDS) can increase, thereby increasing the SC. This TMDL is calculated at a specific flow. The 4Q3 is the annual lowest 4 consecutive day period discharge that will not fall below that discharge at least every 3 years (Waltemeyer 2002). According to the New Mexico Water Quality Standards, the low flow critical condition is defined as 4Q3 (NMAC 20.6.4.11.B.2). Low flow was chosen as the critical flow because of the negative effect decreased, or low, flows have on SC.

It is often necessary to calculate a critical flow for a portion of a watershed where there is no active flow gage. 4Q3 derivations for ungaged streams were based on analysis methods described by Waltemeyer (2002). In this analysis, two regression equations for estimating 4Q3 were developed based on physiographic regions of NM (i.e., statewide and mountainous regions above 7,500 feet in elevation). The decision to use the statewide versus the mountainous equation is based on the average elevation of the assessment unit. The 4Q3 was estimated using the regression equation for mountainous regions because the mean elevations for these assessment units were above 7,500 feet in elevation (**Table 4.1**). The following regression

equation for mountainous regions above 7,500 feet in elevation is based on data from 40 gaging stations with non-zero discharge (Waltemeyer 2002):

$$4Q3 = 7.3287 \times 10^{-5}\ DA^{0.70}\ P_w^{3.58}\ S^{1.35} \quad \text{(Eq. 4-1)}$$

where,

DA = Drainage area (mi^2)
P_w = Average basin mean winter precipitation (inches)

S = Average basin slope (percent)

The average SEE and coefficient of determination are 94 and 66 percent, respectively, for this regression equation (Waltemeyer 2002).

Table 4.1 Calculation of 4Q3 Low-Flow Frequencies

Assessment Unit	Average Elevation (ft.)	Drainage Area (mi^2)	Mean winter precipitation (in.)	Average basin slope	4Q3 (cfs)
Dalton Canyon Creek	8727	14.5	8.85	41.1	0.35
Falls Creek	7687	12.8	7.53	25.3	0.09
Macho Canyon Creek	8944	12.1	9.88	39.2	0.43
Willow Creek	9613	7.97	18.2	32.9	2.27

The 4Q3 value was converted from cubic feet per second (cfs) to units of million gallons per day (mgd) as follows using Equation 4-2. The 4Q3 for Dalton Canyon Creek is 0.23 mgd. The 4Q3 flows for the remaining assessment units are listed in **Table 4.3**.

$$0.35\frac{ft^3}{\sec} \times 1{,}728\frac{in^3}{ft^3} \times 0.004329\frac{gal}{in^3} \times 86{,}400\frac{\sec}{day} \times 10^{-6} = 0.23mgd \quad \text{(Eq. 4-2)}$$

It is important to remember that the TMDL itself is a value calculated at a defined critical condition, and is calculated as part of planning process designed to achieve water quality standards. Since flows vary throughout the year in these systems, the actual load at any given time will vary based on the changing flow. Management of the load to improve stream water quality should be a goal to be attained. Meeting the calculated TMDL may be a difficult objective.

4.3 Calculations

Specific Conductance (SC) may be used to estimate the total ion concentration of a surface water sample, and is often used as an alternative measure of dissolved solids. In order to calculate a load in pounds per day (lbs/day), Total Dissolved Solids (TDS) is used as a surrogate for SC. The TDS to SC ratio ranges from 0.5 to 0.9 milligrams per liter (mg/L)/microhos per centimeter (µmhos/cm) (American Public Health Association 1998). Specific correlation should be derived by site, if TDS values are available. TDS values were obtained during the 2010 SWQB sampling

season. These values as well as the SC values are located in **Appendix C**. The TDS to SC ratio value was calculated, and averaged as displayed in **Table 4.2**. The State WQS to protect the designated HQCWAL use states that SC shall not exceed 300 µmhos/cm. The TDS concentration required to achieve State WQS is defined by Equation 4-3.

$$\text{TDS (mg/L)} \cong \text{SC (µmhos/cm)} \times \text{(ratio)} \quad \text{(Eq. 4-3)}$$

Using the above mentioned reference ratios and an SC value of 300 µmhos/cm, the TDS concentration required to achieve State WQS is:

$$300 \text{ µmhos/cm} \times \text{(ratio)} \cong \text{TMDL translator as TDS mg/L}$$

Table 4.2 TDS and SC ratios for TMDL Translator Determination

Assessment Unit	Average TDS : SC Ratio	TMDL Translator as TDS
Dalton Canyon Creek	0.67	201 mg/L
Falls Creek	0.70	209 mg/L
Macho Canyon Creek	0.70	211 mg/L
Willow Creek	0.71	212 mg/L

For the purpose of TMDL development, these TDS translators were used. The TMDL was developed based on simple dilution calculations using 4Q3 flow and the TDS translator above (from **Equation 4-3**). The TMDL calculation includes wasteload allocations (WLAs), load allocations (LAs), and a margin of safety (MOS).

Target loads for TDS are calculated based on the 4Q3 flow, the current WQS, and a conversion factor of 8.34, that is used to convert mg/L units to pounds per day (lbs/day) (see **Appendix A** for conversion factor derivation).

$$\textit{Critical Flow (mgd) x Standard (mg/L) x 8.34 = Target Loading Capacity} \quad \text{(Eq. 4-4)}$$

The target load (TMDL) predicted to attain standards was calculated using **Equation 4-4** and is shown in **Table 4.3**.

Table 4.3 Calculation of Daily TMDL for TDS (SC surrogate)

Assessment Unit	Flow[(a)] (mgd)	TDS Standard[(b)] (mg/L)	Conversion Factor[(c)]	TMDL (lbs/day)
Dalton Canyon Creek	0.23	201	8.34	385.6
Falls Creek	0.06	209	8.34	104.6
Macho Canyon Creek	0.28	211	8.34	492.7
Willow Creek	1.46	212	8.34	2581

Notes:
(a) Flow is the 4Q3 value calculated on the previous pages converted from cubic feet per second to million gallons per day.
(b) TDS is used as a surrogate measure for SC to calculate a load in lbs/day.
(c) Conversion factor used to convert mg/L to lbs/day (See **Appendix A**).
mgd = Million gallons per day
mg/L = Milligrams per liter
lbs/day = Pounds per day

The measured load was also calculated using **Equation 4-4**. In order to achieve comparability between the target and measured loads, the flow rate used was the same for both calculations. The same conversion factor of 8.34 was used. Results are presented in **Table 4.4**.

Table 4.4 Calculation of Measured Load for TDS (SC surrogate)

Assessment Unit	Flow[(a)] (mgd)	Field TDS[(b)] (mg/L)	Conversion Factor[(c)]	Measured Load (lbs/day)
Dalton Canyon Creek	0.23	277	8.34	531.3
Falls Creek	0.06	259	8.34	129.6
Macho Canyon Creek	0.28	244	8.34	569.8
Willow Creek	1.46	242	8.34	2947

Notes:
(a) Flow is the 4Q3 value calculated on the previous pages converted from cubic feet per second to million gallons per day.
(b) The field measurement is the arithmetic mean of the SC values, converted to TDS (see **Table 4.2**)
(c) Conversion factor used to convert mg/L to lbs/day (See **Appendix A**).
mgd = Million gallons per day
mg/L = Milligrams per liter
lbs/day = Pounds per day

4.4 Waste Load Allocations and Load Allocations

4.4.1 Waste Load Allocation

There are no active point source dischargers on these AUs. Neither are there any Municipal Separate Storm Sewer System (MS4) storm water permits. However, TDS may be a component of some (primarily construction) storm water discharges so these discharges should be addressed.

Storm water discharges from construction activities are transient because they occur mainly during the construction itself, and then only during storm events. Coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for construction sites greater than one acre requires preparation of a Storm Water Pollution Prevention Plan (SWPPP) that includes identification and control of all pollutants associated

with the construction activities to minimize impacts to water quality. The current CGP also includes state-specific requirements to implement site-specific interim and permanent stabilization, managerial, and structural solids, erosion, and sediment control Best Management Practices (BMPs) and/or other controls. BMPs are designed to prevent to the maximum extent practicable an increase in sediment load to the water body or an increase in a sediment-related parameter, such as total suspended solids, turbidity, siltation, stream bottom deposits, etc. BMPs also include measures to reduce flow velocity during and after construction compared to pre-construction conditions to assure that waste load allocations (WLAs) or applicable water quality standards, including the antidegradation policy, are met. Compliance with a SWPPP that meets the requirements of the CGP is generally assumed to be consistent with this TMDL.

Storm water discharges from active industrial facilities are generally covered under the current NPDES Multi-Sector General Permit (MSGP). This permit also requires preparation of an SWPPP, which includes specific requirements to limit (or eliminate) pollutant loading associated with the industrial activities in order to minimize impacts to water quality. Compliance with a SWPPP that meets the requirements of the MSGP is generally assumed to be consistent with this TMDL.

It is not possible to calculate individual WLAs for facilities covered by these General Permits at this time using available tools. However, excess TDS concentrations may be a component of some storm water discharges covered under general NPDES permits, so the load for these dischargers should be addressed. Loads that are in compliance with the General Permits are therefore currently included as part of the load allocation (LA).

4.4.2 Load Allocation

In order to calculate the LA, the WLA and MOS were subtracted from the target capacity (TMDL), as shown below in **Equation 4-5**.

$$WLA + LA + MOS = TMDL \qquad \text{(Eq. 4-5)}$$

Results using a MOS of 15% (as explained in **Section 4.7**), are presented in **Table 4.5**.

Table 4.5 Calculation of TMDL for TDS (SC Surrogate)

Assessment Unit	WLA (lbs/day)	LA (lbs/day)	MOS (lbs/day)	TMDL (lbs/day)
Dalton Canyon Creek	0	327.7	57.83	385.6
Falls Creek	0	88.90	15.69	104.6
Macho Canyon Creek	0	418.8	73.91	492.7
Willow Creek	0	2194	387.2	2581

Notes:
WLA = Waste load allocation
LA = Load allocation
MOS = Margin of safety
TMDL = Total maximum daily load
lbs/day = Pounds per day

The load reduction that would be necessary to meet the target load was calculated to be the difference between the LA (**Table 4.5**) and the measured load (**Table 4.4**), and is shown in **Table 4.6**.

Table 4.6 Calculation of Load Reduction for TDS (SC Surrogate)

Assessment Unit	Target Load (lbs/day)[(a)]	Measured Load (lbs/day)	Load Reduction (lbs/day)	Percent Reduction[(b)]
Dalton Canyon Creek	327.7	531.3	203.6	38
Falls Creek	88.90	129.6	40.71	31
Macho Canyon Creek	418.8	569.8	151.0	26
Willow Creek	2194	2947	752.5	26

Notes:
lbs/day = Pounds per day
[(a)]Target Load = WLA + LA
[(b)]Percent reduction is the percent the existing measured load must be reduced to achieve the target load, and is calculated as follows: (Measured Load – Target Load) / Measured Load x 100

4.5 Identification and Description of Pollutant Source(s)

SWQB fieldwork includes an assessment of the probable sources of impairment (**Appendix B**). The approach for identifying "Probable Sources of Impairment" was modified in 2010 by SWQB to include additional input from a variety of stakeholders including landowners, watershed groups, and local, state, tribal and federal agencies. Probable Source Sheets are filled out by SWQB staff during watershed surveys and watershed restoration activities. The draft probable source list will be reviewed and modified, as necessary, with watershed group/ stakeholder input during the TMDL public meeting and comment period. Pollutant sources that could contribute to the waterbodies are listed in **Table 4.7**. The main sources of impairment along these assessment units appear to be grazing, flow alterations, loss of riparian habitat, and streambank modifications.

Table 4.7 Pollutant Source Summary

Assessment Unit	Pollutant Sources	Magnitude (lbs/day)[(a)]	Probable Sources (% from each)[(b)]
Dalton Canyon Creek	Point Source Nonpoint Source	0 531.3	0% 100% Pavement/impervious surfaces, inappropriate waste disposal, bridges/culverts/RR crossings, paved roads, gravel or dirt roads, highway/road/bridge runoff, angling pressure, dumping/garbage/trash/litter, dispersed campgrounds, drought-related impacts, watershed runoff following
Falls Creek	Point Source Nonpoint Source	0 129.6	0% 100% Pavement/impervious surfaces, bridges/culverts/RR crossings, gravel or dirt roads, highway/road/bridge runoff, wildlife other than waterfowl, rangeland grazing.
Macho Canyon Creek	Point Source Nonpoint Source	0 569.8	0% 100% Rangeland grazing, pavement/impervious surfaces, bridges/culverts/RR crossings, paved roads, gravel or dirt roads, channelization, highway/road/bridge runoff, stream channel incision, drought-related impacts, wildlife other than waterfowl, on-site treatment systems, residences.
Willow Creek	Point Source Nonpoint Source	0 2947	0% 100% Rangeland grazing, pavement/impervious surfaces, RCRA site, bridges/culverts/RR crossings, paved roads, channelization, highway/road/bridge runoff, stream channel incision, wildlife other than waterfowl, abandoned mine/inactive tailings, active mine reclamation, gravel or dirt roads

Notes:
(a) Measured Load (**Table 4.4**).
(b) This list of probable sources is based on staff observation and known land use activities in the watershed. These sources are not confirmed nor quantified at this time.

4.6 Link Between Water Quality and Pollutant Sources

Total dissolved solids (TDS) refers to the total amount of all inorganic and organic substances – including minerals, salts, metals, anions, and cations – that are dispersed within a volume of water. Higher concentrations of TDS may occur during and after precipitation events. In the United States, elevated TDS is often due to natural environmental features such as mineral springs, carbonate deposits, salt deposits, and silt, the decomposition of leaves and plankton, and the weathering erosion of rocks. Other sources may include stormwater and agricultural runoff, mining operations, industrial wastewater, and sewage. An Administrative Order on Consent was signed in 1992 regarding the Pecos Mine near Terrero, NM and the mine reclamation concluded with the final capping and revegetation stage occurring in 2002-2003. An important part of the project was the restoration of Willow Creek and the associated wetlands and riparian habitats.

As noted in **Section 4.2**, as flow decreases, the concentration of total dissolved solids (TDS) can increase, thereby increasing the SC. Similarly, as flows decline, temperatures have a tendency to increase, thus affecting SC values. **Figure 4.1** provides an example of this relationship using 2010 flow, TDS, and specific conductance data from Falls Creek.

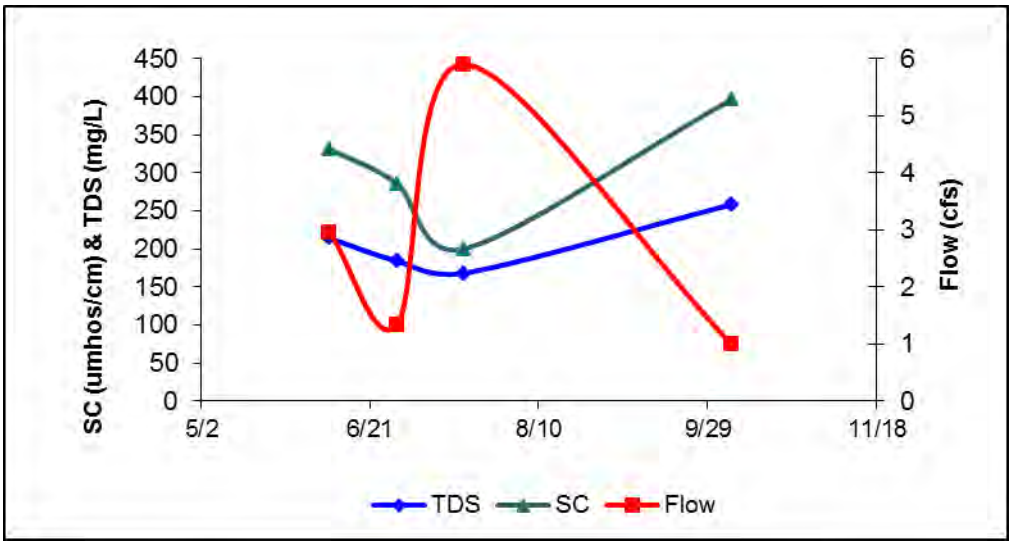

Figure 4.1 Falls Creek SC versus flow relationship

The electrical conductivity of water is directly related to the concentration of dissolved solids in the water because TDS concentrations are equal to the sum of positively charged ions (cations) and negatively charged ions (anions) in the water. These electrically charged dissolved particles make ordinary natural water a good conductor of electricity. Conversely, pure water has a high electrical resistance, and resistance is frequently used as a measure of its purity.

Conductivity is measured by SWQB in microSiemens per centimeter (µS/cm). The conductivity of rivers in the United States generally ranges from 50 to 1500 µmhos/cm. Studies of inland fresh waters indicate that streams supporting good mixed fisheries have a range between 150 and 500 µS/cm. Conductivity outside this range could indicate that the water is not suitable for certain species of fish or macroinvertebrates. Exceedences can occur during low flows as well as following episodic rain events.

Conductivity in streams and rivers is affected primarily by the geology of the area through which the water flows. Streams that run through areas with granite bedrock tend to have lower conductivity because granite is composed of more inert materials that do not dissolve into ionic components when washed into the water. On the other hand, streams that run through areas with clay soils tend to have higher conductivity because of the presence of materials that ionize when washed into the water. Groundwater inflows can have the same effects depending on the bedrock they flow through. In addition, discharges to streams can change the conductivity depending on their make-up. For example, a failing sewage system would raise the conductivity because of the presence of chloride, phosphate, and nitrate.

Where data gaps exist or the level of uncertainty in the characterization of sources is large, the recommended approach to TMDL assignments requires the development of allocations based on estimates utilizing the best available information.

The Probable Source Identification Sheets in **Appendix B** provide an approach for a visual analysis of a pollutant source along an impaired reach. Although this procedure is subjective, SWQB feels that it provides the best available information for the identification of probable sources of impairment in a watershed. The list of "Probable Sources" is not intended to single out any particular land owner or single land management activity and has therefore been labeled "Probable" and generally includes several sources for each impairment. **Table 4.7** displays probable sources of impairment along each reach as determined by field reconnaissance and assessment. Probable sources of nutrients will be evaluated, refined, and changed as necessary through the Watershed-Based Plan (WBP).

4.7 Margin of Safety

TMDLs should reflect a MOS based on the uncertainty or variability in the data, the point and nonpoint source load estimates, and the modeling analysis. For this TMDL, there is no MOS for point sources, since there are none. However, for the nonpoint sources the MOS for SC is estimated to be an addition of 15 percent of the TMDL. This MOS incorporates several factors:

- Errors in calculating nonpoint source loads

  A level of uncertainty exists in sampling nonpoint sources of pollution. Accordingly, a conservative MOS increases the TMDL by **10 percent**.

- Errors in calculating flow

  A 4Q3 flow value for these ungaged streams was estimated based on a regression equation from Waltemeyer (2002). There is inherent error in all flow calculations. A conservative MOS for this element is therefore **5 percent**.

4.8 Consideration of Seasonal Variation

Data used in the calculation of this TMDL were collected during high and low flow seasons in order to ensure coverage of any potential seasonal variation in the system. Exceedences were observed in March through October which are months that capture the spring snow melt, summer monsoonal rains, and baseflow conditions. The critical condition used for calculating the TMDL was low flow.

4.9 Future Growth

Growth estimates by county are available from the New Mexico Bureau of Business and Economic Research. These estimates project growth to the year 2040. The Pecos Headwaters

HUC extends over portions of six counties: Guadalupe, San Miguel, Santa Fe, Mora, Quay, and De Baca, however most of the HUC is within San Miguel and Guadalupe counties. The populations of San Miguel, Quay, and Mora Counties are projected to decrease by 3-10 percent over the 2010-2040 period. Guadalupe County is expected to grow 2.6 percent over the 2010-2040 period, whereas Santa Fe County expects a growth of 25 percent and De Baca County expects a 35 percent increase over the same 2010-2040 time period. None of the streams addressed in this document are in De Baca County and those located in Santa Fe County are in the wilderness areas and outside of the Santa Fe urban area.

Estimates of future growth are not anticipated to lead to a significant increase in conductance and/or total dissolved solids that cannot be controlled with best management practices (BMPs) in this watershed. However, it is imperative that BMPs continue to be utilized in this watershed to improve road conditions and grazing allotments and adhere to SWPPP requirements related to construction and industrial activities covered under the general permit.

5.0 MONITORING PLAN

Pursuant to CWA Section 106(e)(1), the SWQB has established appropriate monitoring methods, systems and procedures in order to compile and analyze data on the quality of the surface waters of New Mexico. In accordance with the New Mexico Water Quality Act, the SWQB has developed and implemented a comprehensive water quality monitoring strategy for the surface waters of the State.

The monitoring strategy establishes the methods of identifying and prioritizing water quality data needs, specifies procedures for acquiring and managing water quality data, and describes how these data are used to progress toward three basic monitoring objectives: to develop water quality-based controls, to evaluate the effectiveness of such controls, and to conduct water quality assessments. SWQB revised its 10-year monitoring and assessment strategy (NMED/SWQB 2010a) and submitted it to EPA Region 6 for review on March 23, 2010. The strategy details both the extent of monitoring that can be accomplished with existing resources plus expanded monitoring strategies that could be implemented given additional resources.
The SWQB utilizes a rotating basin approach to water quality monitoring. In this approach, a select number of watersheds are intensively monitored each year with an established return frequency of approximately every eight years. The next scheduled monitoring date for the Upper Pecos River Watershed is 2018. The SWQB maintains current quality assurance and quality control plans to cover all monitoring activities. This document, called the QAPP, is updated and certified annually by USEPA Region 6. In addition, the SWQB identifies the data quality objectives required to provide information of sufficient quality to meet the established goals of the program. Current priorities for monitoring in the SWQB are driven by the CWA Section 303(d) list of streams requiring TMDLs. Short-term efforts were directed toward those waters that are on the USEPA TMDL consent decree list (U.S. District Court for the District of New Mexico 1997), however NMED/SWQB completed the final remaining TMDL on the consent decree in December 2006 and USEPA approved this TMDL in August 2007. The U.S. District Court dismissed the Consent Decree on April 21, 2009.

Once assessment monitoring is completed, those reaches showing impacts and requiring a TMDL will be targeted for more intensive monitoring. The methods of data acquisition include fixed-station monitoring, intensive surveys of priority assessment units (including biological assessments), and compliance monitoring of industrial, federal, and municipal dischargers, as specified in the SWQB Standard Operating Procedures (NMED/SWQB 2010a).

Long-term monitoring for assessments will be accomplished through the establishment of sampling sites that are representative of the waterbody and which can be revisited approximately every eight years. This information will provide time relevant information for use in CWA Section 303(d) listing and 305(b) report assessments and to support the need for developing TMDLs. The approach provides:

- a systematic, detailed review of water quality data which allows for a more efficient use of valuable monitoring resources;
- information at a scale where implementation of corrective activities is feasible;
- an established order of rotation and predictable sampling in each basin which allows for enhanced coordinated efforts with other programs; and

- program efficiency and improvements in the basis for management decisions.

It should be noted that a watershed would not be ignored during the years in between water quality surveys. The rotating basin program will be supplemented with other data collection efforts such as the funding of long-term USGS water quality gaging stations for long-term trend data and on-going studies being performed by the USGS and USEPA. Data will be analyzed and field studies will be conducted to further characterize acknowledged problems and TMDLs will be developed and implemented accordingly. Both long-term and intensive field studies can contribute to the State's Integrated §303(d)/§305(b) listing process for waters requiring TMDLs.

6.0 IMPLEMENTATION OF TMDLS

6.1 Point Sources – NPDES Permitting

Specific permit implementation discussions for *E. coli* are included in **Section 3.4.1**, specifically regarding the Clean Water Act violations by the City of Santa Rosa regarding the failure of the City of Santa Rosa WWTP to meet the *E. coli* effluent limits. The WLA assigned to the NM0024988 permit is based on the *E. coli* criterion in 20.6.4.212 and the WWTP design flow of 0.67 mgd. There are no other NPDES permits that discharge to assessment units addressed in this document.

6.2 Nonpoint Sources – WBP and BMP Coordination

Public awareness and involvement will be crucial to the successful implementation of these plans and improved water quality. A Watershed-based Plan (WBP) is a written plan intended to provide a long-range vision for various activities and management of resources in a watershed. It includes opportunities for private landowners and public agencies in reducing and preventing nonpoint source impacts to water quality. This long-range strategy will become instrumental in coordinating efforts to achieve water quality standards in the watershed. The WBP is essentially the Implementation Plan, or Phase Two of the TMDL process. The completion of the TMDLs and WBP leads directly to the development of on-the-ground projects to address surface water impairments in the watershed.

SWQB staff will continue to provide technical assistance such as selection and application of BMPs needed to meet WBP goals. Stakeholder public outreach and involvement in the implementation of this TMDL will be ongoing. Stakeholders in this process will include the Upper Pecos Watershed Association and others currently active in the watershed. The SWQB received EPA approval in December 2012 of the WBP developed by the Upper Pecos Watershed Association. The plan addresses temperature, sedimentation, nutrient, and specific conductance impairments in the Upper Pecos River watershed. A Watershed Restoration Action Strategy was developed for the Gallinas River Watershed in 2005.

The Tres Lagunas Fire burned 10,219 acres north of Pecos, New Mexico from May 30-June 15, 2013. SWQB staff attended public meetings in Las Vegas and Pecos both during and after the fire. **Appendix E** includes information on the Tres Lagunas Fire. The Jarosa Fire burned 11,149 acres in the Upper Pecos watershed from June 10 – July 5, 2013. SWQB staff also created the *Wildfire Impacts on Surface Water Quality* incident-related website www.nmenv.state.nm.us/swqb/Wildfire to further inform stakeholders and management agencies about the water quality impacts from fires.

6.3 Clean Water Act §319(h) Funding

The Watershed Protection Section of the SWQB can potentially provide USEPA §319(h) funding to assist in implementation of BMPs to address water quality problems on reaches listed as category 4 or 5 waters on the Integrated §303(d)/ §305(b) list. These monies are available to

all private, for-profit, and nonprofit organizations that are authenticated legal entities, or governmental jurisdictions including: cities, counties, tribal entities, Federal agencies, or agencies of the State. Proposals are submitted by applicants through a Request for Proposal (RFP) process. Selected projects require a non-federal match of 40% of the total project cost consisting of funds and/or in-kind services. Funding is potentially available, generally annually, for both watershed-based planning and on-the-ground projects to improve surface water quality and associated habitat. Further information on funding from the CWA §319(h) can be found at the SWQB website: www.nmenv.state.nm.us/swqb.

6.4 Other Funding Opportunities and Restoration Efforts in the Upper Pecos Basin

Several other sources of funding exist to address impairments discussed in this TMDL document. NMED's Construction Programs Bureau assists communities in need of funding for WWTP upgrades and improvements to septic tank configurations. They can also provide matching funds for appropriate CWA §319(h) projects using state revolving fund monies. The USDA Natural Resources Conservation Service Environmental Quality Incentive Program (EQIP) program can provide assistance to private land owners in the basin. The USDA Forest Service aligns their mission to protect lands they manage with the TMDL process, and are another source of assistance. The BLM has several programs in place to provide assistance to improve unpaved roads and grazing allotments.

7.0 APPLICABLE REGULATIONS and STAKEHOLDER ASSURANCES

New Mexico's Water Quality Act (Act) authorizes the WQCC to "promulgate and publish regulation to prevent or abate water pollution in the state" and to require permits. The Act authorizes a constituent agency to take enforcement action against any person who violates a water quality standard. Several statutory provisions on nuisance law could also be applied to NPS water pollution. The Water Quality Act also states in §74-6-12(a):

> *The Water Quality Act (this article) does not grant to the commission or to any other entity the power to take away or modify the property rights in water, nor is it the intention of the Water Quality Act to take away or modify such rights.*

In addition, the State of New Mexico Surface Water Quality Standards (see Subsection C of 20.6.4.6 NMAC) (NMAC 2007) states:

> *Pursuant to Subsection A of Section 74-6-12 NMSA 1978, this part does not grant to the water quality control commission or to any other entity the power to take away or modify property rights in water*.

New Mexico policies are in accordance with the federal Clean Water Act §101(g):

> *It is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this Act. It is the further policy of Congress that nothing in this Act shall be construed to supersede or abrogate rights to quantities of water which have been established by any State. Federal agencies shall co-operate with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources.*

New Mexico's CWA §319 Program has been developed in a coordinated manner with the State's 303(d) process. All 319 watersheds that are targeted in the annual RFP process coincide with the State's biennial impaired waters list as approved by USEPA. Section 319 funds are further prioritized to target impaired waters with developed TMDLs, and a smaller category of impaired waters which do not require TMDLs because the impairment is considered to be related to flow rather than excessive pollutant loading. The State has given a high priority for funding, assessment, and restoration activities to these watersheds.

As a constituent agency, NMED has the authority under Chapter 74, Article 6-10 NMSA 1978 to issue a compliance order or commence civil action in district court for appropriate relief if NMED determines that actions of a "person" (as defined in the Act) have resulted in a violation of a water quality standard including a violation caused by a NPS. The NMED NPS water quality management program has historically strived for and will continue to promote voluntary compliance to NPS water pollution concerns by utilizing a voluntary, cooperative approach. The State provides technical support and grant monies for implementation of BMPs and other NPS prevention mechanisms through §319 of the Clean Water Act. Since portions of this TMDL will be implemented through NPS control mechanisms, the New Mexico Watershed Protection Program will target efforts to this and other watersheds with TMDLs.

In order to obtain reasonable assurances for implementation in watersheds with multiple landowners, including federal, state and private land, NMED has established Memoranda of Understanding (MOUs) with various federal agencies, in particular the Forest Service and the Bureau of Land Management. MOUs have also been developed with other state agencies, such as the New Mexico Department of Transportation. These MOUs provide for coordination and consistency in dealing with NPS issues.

The time required to attain standards for all reaches is estimated to be approximately 10-20 years. This estimate is based on a five-year time frame implementing several watershed projects that may not be starting immediately or may be in response to earlier projects. Stakeholders in this process will include SWQB, and other parties identified in the WBP. The cooperation of watershed stakeholders will be pivotal in the implementation of these TMDLs as well.

8.0 PUBLIC PARTICIPATION

Public participation was solicited in development of this TMDL. The public draft TMDL was made available for a 30-day comment period beginning on July 10, 2013. Response to comments were attached as **Appendix F** to the final draft document. The draft document notice of availability was extensively advertised via newsletters, email distribution lists, webpage postings (http://www.nmenv.state.nm.us), and press releases to area newspapers. A public meeting was held on July 23, 2013 at the Upper Pecos Watershed Association in Pecos. The SWQB received approval of the Final Draft TMDL from the Water Quality Control Commission (WQCC) at their September 10, 2013 public meeting.

Now that the TMDL has been approved by the WQCC, the next step for public participation is to include activities as described in **Section 6.0** and participation in watershed protection projects including those that may be funded by Clean Water Act Section 319(h) grants.

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APPENDIX A

CONVERSION FACTOR DERIVATIONS

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FLOW

Flow (as million gallons per day [MGD]) and concentration values (milligrams per liter [mg/L]) must be multiplied by a conversion factor in order to express the load in units “pounds per day.” The following expressions detail how the conversion factor was determined.
TMDL Calculation:

$$Flow\ (MGD) \times Concentration\ \left(\frac{mg}{L}\right) \times CF\left(\frac{L-lb}{gal-mg}\right) = Load\left(\frac{lb}{day}\right)$$

Conversion Factor Derivation:

$$CF = 10^6 \times \frac{3.785\ L}{gal} \times \frac{1\ lb}{454{,}000\ mg} = 8.34\left(\frac{L-lb}{gal-mg}\right)$$

Flow is converted from cfs to MGD by the following equation:

$$\left(\frac{ft^3}{s}\right) * \left(\frac{86{,}400\ s}{1\ day}\right) * \left(\frac{7.48\ gal}{ft^3}\right) * \left(\frac{1\ Million\ gal}{1{,}000{,}000\ gal}\right) = MGD$$

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APPENDIX B

PROBABLE SOURCES OF IMPAIRMENT

"Sources" are defined as activities that may contribute pollutants or stressors to a water body (USEPA 1997). The list of "Probable Sources of Impairment" in the Integrated 303(d)/305(b) List, Total Maximum Daily Load documents (TMDL's), and Watershed-Based Plans (WBP's) is intended to include any and all activities that could be contributing to the identified cause of impairment. Data on Probable Sources is routinely gathered by Monitoring and Assessment Section staff and Watershed Protection Section staff during water quality surveys and watershed restoration projects and is housed in the Assessment Database (ADB version 2). ADB was developed by USEPA to help states manage information on surface water impairment and to generate §303(d)/ §305(b) reports and statistics. More specific information on Probable Sources of Impairment is provided in individual watershed planning documents (e.g., TMDL's, WBP's, etc) as they are prepared to address individual impairments by assessment unit.

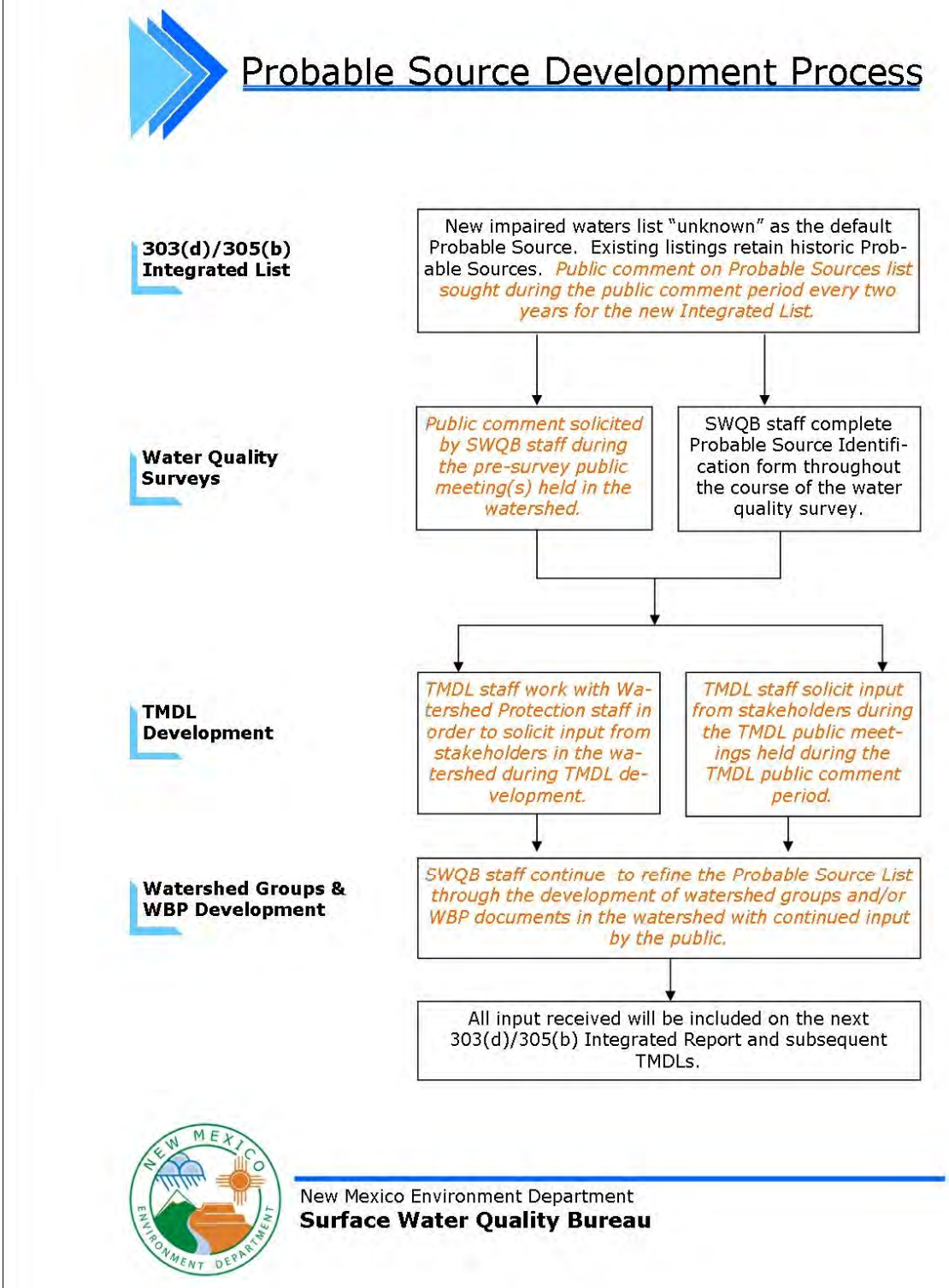
USEPA through guidance documents strongly encourages states to include a list of Probable Sources for each listed impairment. According to the 1998 305(b) report guidance, "…, states must always provide aggregate source category totals…" in the biennial submittal that fulfills CWA section 305(b)(1)(C) through (E) (USEPA 1997). The list of "Probable Sources" is not intended to single out any particular land owner or single land management activity and has therefore been labeled "Probable" and generally includes several sources for each known impairment.

The approach for identifying "Probable Sources of Impairment" was recently modified by SWQB. Any new impairment listing will be assigned a Probable Source of "Source Unknown." Probable Source Sheets will continue to be filled out during watershed surveys and watershed restoration activities by SWQB staff. Information gathered from the Probable Source Sheets will be used to generate a draft Probable Source list in consequent TMDL planning documents. These draft Probable Source lists will be finalized with watershed group/stakeholder input during the pre-survey public meeting, TMDL public meeting, WBP development, and various public comment periods. The final Probable Source list in the approved TMDL will be used to update the subsequent Integrated List.

Literature Cited:

USEPA. 1997. Guidelines for preparation of the comprehensive state water quality assessments (305(b) reports) and electronic uptakes. EPA-841-B-97-002A. Washington, D.C.

Figure B1. Probable Source Development Process and Public Participation Flowchart



APPENDIX C

E. coli and TDS data

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Table C.1: E.coli data

Station	Date	E.coli (cfu/100mL)
50ElRito000.2	2010-05-25	435.2
50ElRito000.2	2010-07-13	2419.6
50ElRito000.2	2010-09-07	8.5
50ElRito000.2	2010-09-07	6.3
50ElRito000.2	2010-10-20	8.4
50ElRito000.2	2010-11-10	13.1
50PecosA000.3	2010-12-07	5.2
50PecosA000.3	2010-04-06	9.6
50PecosA000.3	2010-10-27	76.3
50PecosA000.3	2010-07-19	248.1
50PecosA000.3	2010-08-04	1046.2
50PecosA000.3	2010-11-16	7.5
50PecosA000.3	2010-11-16	12.2
50PecosA000.3	7/16/2008	2419.6
50PecosA000.3	10/9/2008	579.4
50PecosA007.9	7/16/2008	78
50PecosA007.9	10/9/2008	7.5
50PecosR601.2	2010-05-25	59.1
50PecosR601.2	2010-04-14	480
50PecosR651.0	2010-05-12	35
50PecosR651.0	2010-05-12	29.8
50PecosR651.0	2010-04-07	93.4
50PecosR651.0	2010-08-27	1119.9
50PecosR651.0	2010-06-23	75.2
50PecosR651.0	2010-06-29	2419.6
50PecosR651.0	2010-07-13	72.3
50PecosR651.0	2010-09-07	307.6
50PecosR651.0	2010-09-07	218.7
50PecosR651.0	2010-10-20	148.3
50PecosR651.0	2010-11-10	12.2
8379500	2009-11-09	21
8379500	2010-04-15	190
8379500	2010-06-28	800
8379500	2010-08-31	24
8382650	2010-09-01	18
8382650	2009-06-02	23
8382650	2009-11-02	47

Station	Date	E.coli (cfu/100mL)
8382650	2007-10-30	52
8382650	2008-06-11	59
8382650	2010-04-16	180
8382650	2009-02-17	12
8382650	2008-10-27	20

Table C.2. Dalton Canyon- specific Conductance and TDS data

Station	Date	SC (uS/cm)	TDS (mg/L)	TDS:SC ratio	Average ratio	Translator[1]
50Dalton000.1	2010-09-29	315	210	0.66666667	0.67	201
50Dalton000.1	2010-10-12	339	236	0.69616519		
50Dalton000.1	2010-09-08	339	216	0.63716814		
50Dalton000.1	2010-06-17	294	200	0.68027211		

[1]Translator calculated as follows: 300 uS/cm x ratio

Table C.3. Falls Creek- specific Conductance and TDS data

Station	Date	SC (uS/cm)	TDS (mg/L)	TDS:SC ratio	Average ratio	Translator[1]
50FallsC000.1	2010-06-09	331	214	0.64652568	0.70	209
50FallsC000.1	2010-06-29	286	184	0.64335664		
50FallsC000.1	2010-07-19	200	168	0.84		
50FallsC000.1	2010-10-06	396	258	0.65151515		

[1]Translator calculated as follows: 300 uS/cm x ratio

Table C.4. Macho Canyon Creek - specific Conductance and TDS data

Station	Date	SC (uS/cm)	TDS (mg/L)	TDS:SC ratio	Average ratio	Translator[1]
50MachoC000.2	2010-09-29	242	204	0.84297521	0.70	211
50MachoC000.2	2010-10-12	349	224	0.64183381		
50MachoC000.2	2010-09-08	317	204	0.64353312		
50MachoC000.2	2010-06-17	238	162	0.68067227		

[1]Translator calculated as follows: 300 uS/cm x ratio

Table C.5. Willow Creek - specific Conductance and TDS data

Station	Date	SC (uS/cm)	TDS (mg/L)	TDS:SC ratio	Average ratio	Translator[1]
50Willow000.1	2010-07-14	315	206	0.65396825	0.71	212
50Willow000.1	2010-12-01	333	194	0.58258258		
50Willow000.1	2010-10-12	318	214	0.67295597		
Willow Creek abv Barrier	12-8-2009	233.7	210	0.89858793		
Willow Creek abv Barrier	1-30-2008	302.7	190	0.62768418		
Willow Creek abv Barrier	2-03-2010	231.9	190	0.81931867		
Willow Creek abv Barrier	2-08-2007	253.3	170	0.67114094		
Willow Creek abv Barrier	3-15-2006	317	180	0.56782334		
Willow Creek abv Barrier	3-15-2006	210	200	0.95238095		

[1]Translator calculated as follows: 300 uS/cm x ratio

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APPENDIX D

KEY TO GEOLOGIC FORMATIONS

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NAME	UNIT
&	Pennsylvanian rocks, undivided; in Sangre de Cristo Mountains may include
&m	Madera Formation (Limestone
&s	Sandia Formation
@c	Chinle Group
@cu	Upper Chinle Group, Garita Creek through Redonda Formations, undivided
@g	Garita Creek Formation
@s	Santa Rosa Formation
@t	Trujillo Formation
J	Jurassic rocks, Middle and Upper, undivided
Je	Entrada Sandstone, Middle Jurassic; Callovian
Jm	Morrison Formation
Jsr	San Rafael Group; consists of Entrada Sandstone, Todilto and Summerville Formations,
Kc	Carlile Shale
Kdg	Dakota Group of east-central and northeast New Mexico
Kgg	Graneros Shale and Greenhorn Formation
Kgh	Greenhorn Formation
Kgr	Graneros Shale
Ku	Upper Cretaceous, undivided. Includes Virden Formation in northern Hidalgo County,
M	Mississippian rocks, undivided; Arroyo Penasco Group in Sangre de Cristo
P	Permian rocks, undivided
P&	Permian and Pennsylvanian rocks
Pat	Artesia Group
Pg	Glorieta Sandstone; texturally and mineralogically mature, high-silica quartz sandstone
Psa	San Andres Formation; limestone and dolomite with minor shale; Guadalupian in south, in part Leonardian to north
Py	Yeso Formation; sandstones, siltstones, anhydrite, gypsum, halite, and dolomite; Leonardian
Qa	Alluvium
Qoa	Older alluvial deposits of upland plains and piedmont areas, and calcic soils and eolian cover sediments of High Plains region;
Qp	Piedmont alluvial deposits: upper and middle Quaternary
Qpl	Lacustrine and playa-lake deposits
To	Ogallala Formation, alluvial and eolian deposits, and petrocalcic soils of the southern High Plains;
Xm	Lower Proterozoic metamorphic rocks, dominantly felsic volcanic, volcaniclastic
Xmo	Lower Proterozoic metamorphic rocks, dominantly mafic (1720-1760 Ma)
Xms	Lower Proterozoic metasedimentary rocks (1650-1700 Ma). Essentially equivalent to Hondo Group;
Xp	Lower Proterozoic plutonic rocks (older than 1600 Ma)
YXp	Middle and Lower Proterozoic plutonic rocks, undivided

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APPENDIX E

FINAL TRES LAGUNAS AND JAROSA FIRE INCIDENT REPORTS

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InciWeb
Incident Information System

Select an incident [incident] Select a state [state] [go]

Due to high demand, this Web site may become unresponsive. We are working to address these issues. Thank you for your patience.

Tres Lagunas Fire

NEWS RELEASE

TRES LAGUNAS UPDATE Thursday June 20, 2013 9:00 a.m.
Start Date: 5/30/13 Size: 10,219 acres Cause: Human Fuels: Timber Terrain: Steep/Rugged Containment: 90% Location:15 miles N. of Pecos,NM Resources Committed: 152 personnel; 2-Type II crews, 5-Type... more

INCIDENT UPDATED 21 HRS. AGO

Approximate Location

35.714 latitude, -105.681 longitude [reset view]

Incident Overview

Fire is now being managed by a Type 4 Incident Management Team, under the local jurisdiction of the Santa Fe National Forest, Pecos/Las Vegas Ranger District. Todd Wood is the Incident Commander. The public is advised to contact the Pecos Ranger District at 505-757-6121, for information regarding the Tres Lagunas Fire. **This is the last daily update for Tres Lagunas Fire.**

Fire information: This is the last daily update for Tres Lagunas Fire.

For information on the Tres Lagunas Fire, call the Pecos Ranger Station at 505-757-6121.

Maps and photos can be found at: **www.inciweb.nwcg.gov/incident/3401**

Basic Information

Incident Type	Wildfire
Cause	Downed Power Line/human
Date of Origin	Thursday May 30th, 2013 approx. 03:00 PM
Location	10 miles North of Pecos, NM
Incident Commander	Todd Wood

Current Situation

Total Personnel	165
Size	10,219 acres
Percent Contained	90%
Estimated Containment Date	Saturday June 15th, 2013 approx. 12:00 PM
Fuels Involved	Ponderosa pine and mixed conifer with heavy fuel loading. Mixed brush and aspen along with heavy downed fuels within the 2000 Viveash Fire scar.
Fire Behavior	Creeping and smoldering with limited hot spots

UNIT INFORMATION

Santa Fe National Forest
U.S. Forest Service
11 Forest Lane
Santa Fe, NM 87508

INCIDENT CONTACTS

Fire Information
Phone: 505 757 2952
Hours: Mon-Sun 8a.m. - 9p.m.
more contacts »

RECENT ARTICLES

Final Tres Lagunas Update Friday June 21, 2013 9:00 AM
News - 6 days ago

Tres Lagunas Update Thursday June 20, 2013 9:00 AM
News - 7 days ago

Tres Lagunas Update Wednesday, June 19, 2013 10 AM
News - 6/19/2013

Tres Lagunas Fire Update Monday, June 18, 2013 9 AM
News - 6/18/2013

RELATED INCIDENT LINKS

New Mexico Fire Information
Nm Dept. of Health Smoke Info
Southwest Coordination Center (swcc)
Frequently Asked Questions
Fire Weather Forecast
Wildland Fire Maps and Data in Google Earth
Ready, Set, Go Action Guide
Sw Smoke Outlook
Nm Fire Info on Facebook
Nm Fire Info on Twitter
Active Fire Maps
Tres Lagunas Post-Fire Response

INCIDENT COOPERATORS

Fish and Wildlife Service
New Mexico Department of Transportation
New Mexico State Forestry Division
New Mexico State Police
Nm Office of Homeland Security
Office of Governor Susana Martinez
Pecos National Historical Park
Red Cross

Significant Events	Red Flag warnings over the entire area today, and another Red Flag forecast for tomorrow

Outlook

Planned Actions	Continued mop-up, patrol and rehab
Growth Potential	Low
Terrain Difficulty	Extreme
Remarks	Land Ownership: 28% state/private, 72% US Forest Service.

Current Weather

Wind Conditions	22 mph SW
Temperature	78 degrees
Humidity	8%

San Miguel County Emergency Management

Santa Fe National Forest

FOLLOW THIS INCIDENT

Twitter Feed
Article RSS Feed
Google Earth Network Feed

help »

SHARE THIS

Twitter
Facebook
Digg
Del.icio.us
StumbleUpon

InciWeb
Incident Information System

Select an incident incident
Select a state state

Due to high demand, this Web site may become unresponsive. We are working to address these issues. Thank you for your patience.

Jaroso Fire

NEWS RELEASE

Jaroso Fire Update July 4, 2013
WILDLAND FIRE MANAGEMENT TEAM Fire Information: 505-438-5446 For Immediate Release: July 4, 2013, 8 a.m. Fire Facts Date Reported: 06/10/2013 Number of Personnel: 53 Location: Espanola and Pecos-Las.. more

INCIDENT UPDATED 7/25/2013

Approximate Location

35.911 latitude, -105.728 longitude

Incident Overview

General Information/Announcements:

The Northern Rockies Wildland Fire Management Team will be leaving on Friday July 5. Requests for Jaroso Fire information will be handled by the Santa Fe National Forest, 505-438-5446.

The Jaroso Fire is burning in the rugged, steep, deep canyons of the Pecos Wilderness. It is burning in mixed-conifer, heavy dead and down, woody material with pockets of bug-killed trees, and has burned through the 1300-acres of blowdown from 2007.

The public is asked to use extra caution when traveling along NM 63 from Rowe towards the Pecos Canyon due to high vehicle traffic in those areas.

Monsoon season often brings heavy rain. Upper and lower Pecos Canyon residents should remain alert to possible flooding.

Firefighter, aviator and public safety remain a priority on the Jaroso fire.

Yesterday's Significant Events:

A stakeholders meeting was held to discuss updated Wildland Fire Decision Support System (WFDSS) decisions and the schedule for the Forest transition with the incident management team.

A public meeting was held in the community of Pecos.

The percentage of containment is given when firefighters have line constructed on portions of the fire's edge. On this fire because of safety considerations, no line was constructed directly on the fire's perimeter. There are sections of the fire that have shown no activity for more than four days. These areas pose no immediate threat of expanding beyond the existing fire perimeter.

Resources continued to assess private lands and structures along the Pecos River corridor and along the east side of the fire in the Las Vegas area.

The process of releasing firefighting resources is ongoing.

Today's activity ongoing:

Fire personnel, including Pecos Canyon Fire Department continue to coordinate structure assessments

UNIT INFORMATION

Santa Fe National Forest
U.S. Forest Service
11 Forest Lane
Santa Fe, NM 87508

INCIDENT CONTACTS

General Information
Phone: 505-438-5446

more contacts »

RECENT ARTICLES

Jaroso Fire Update July 4, 2013
News - 7/4/2013

Jaroso Fire Update July 3, 2013
News - 7/3/2013

Jaroso Fire Update July 2, 2013
News - 7/2/2013

Jaroso Fire Update July 1, 2013
News - 7/1/2013

RELATED INCIDENT LINKS

Interactive Nm Wildfires Map
Wildland Fire Data in Google Earth
Nm Fire Info
Spot Weather Forecast
Frequently Asked Questions
Nm Dept. of Health Smoke Info
Ready, Set, Go Action Guide
Sw Smoke Outlook
Nm Fire Info Twitter
Nm Fire Info Facebook
Santa Fe Ski Webcam
Active Fire Maps
Beatty'S Historic Cabin
Jaroso Post-Fire Response

INCIDENT PERIMETERS

Fire Perimeter 07-12-2013
Fire Perimeter 07-11-2013
Fire Perimeter 07-09-2013
Fire Perimeter 07-06-2013
Fire Perimeter 07-04-2013
Fire Perimeter 07-03-2013
Fire Perimeter 06-30-2013
Fire Perimeter 06-28-2013
Fire Perimeter 06-26-2013
Fire Perimeter 06-25-2013

Requires Google Earth
Source: USGS Rocky Mountain Geographic Science Center

FOLLOW THIS INCIDENT

along the Pecos River corridor and structures on the east side of the fire in the Walker Flats area.

Weather permitting; a reconnaissance flight will be conducted today for the incoming Burned Area Emergency Response team (BAER).

Afternoon thunder storms over the fire could preclude us from using aviation resources today.

Fire Behavior:

Fire growth remains minimal.

Significant heat and dry fuels remain a factor influencing fire behavior today in areas such as Horsethief Meadows.

The existing spot fires south of Horsethief Meadows should continue to be inactive due to rain, high humidity and the use of helicopter water drops.

All other areas of heat should be minimally active. Fire in the Pecos River remains inactive due to suppression efforts taken there. No impacts are expected in the Pecos River area today.

Heavy fuels on the interior of the fire will continue to burn out producing visible smoke.

Today's Weather: Partly cloudy. Rain showers and thunderstorms are likely. Expect slope, valley winds out of the southwest, becoming northerly at four to eight MPH. Ridgetop winds will be southwest at 11 MPH. Today's expected temperatures will be 75 to 80 degrees.

Areas of concern: Those properties located south and east of the fire. Valleys at risk south of the fire include: Jack's Creek Campground, Iron Gate Campground, Panchuela Campground and structures in Grass Mountain, Pecos Canyon Estates, Winsor, Cowles and the Panchuela area. Values at risk east of the fire include: an electronic site, and numerous structures in, Maestas Canyon, Pendaries, Upper and Lower Rociada, Gascon, Camp Davis and structures along State Road 276 and Forest Service Road 60.

Evacuations: No evacuations have been ordered at this time. A complete checklist of things residents should consider bringing with them on an evacuation is available online at: http://www.fireadapted.org/role/residents-and-homeowners.aspx.

Smoke: Smoke has dissipated because of the higher humidity and cooler temperatures. For a detailed smoke forecast visit: http://gacc.nifc.gov/swcc/predictive/outlooks/smoke/swcc_smoke_outlook.pdf. For information on wildland fire smoke and your health visit: https://nmtracking.org/en/environ_exposure/fire-and-smoke/.

Santa Fe National Forest Fire Restrictions and Closures: Due to extreme fire danger and current active fires, the entire Santa Fe National Forest is closed to the public, with the exception of the Rio Chama Scenic River corridor and the Valles Caldera staging area. The entire Pecos Wilderness including access from the Carson NF (Santa Barbara area) is closed to public entry for the protection of human health and safety. For additional restriction and closure information, please visit: www.firerestrictions.us/nm or http://www.fs.usda.gov/santafe/ ###

Basic Information

Incident Type	Wildfire
Cause	Lightning
Date of Origin	Monday June 10th, 2013 approx. 01:45 PM
Location	8 miles south of Truchas, NM
Incident Commander	Jon Boe

Current Situation

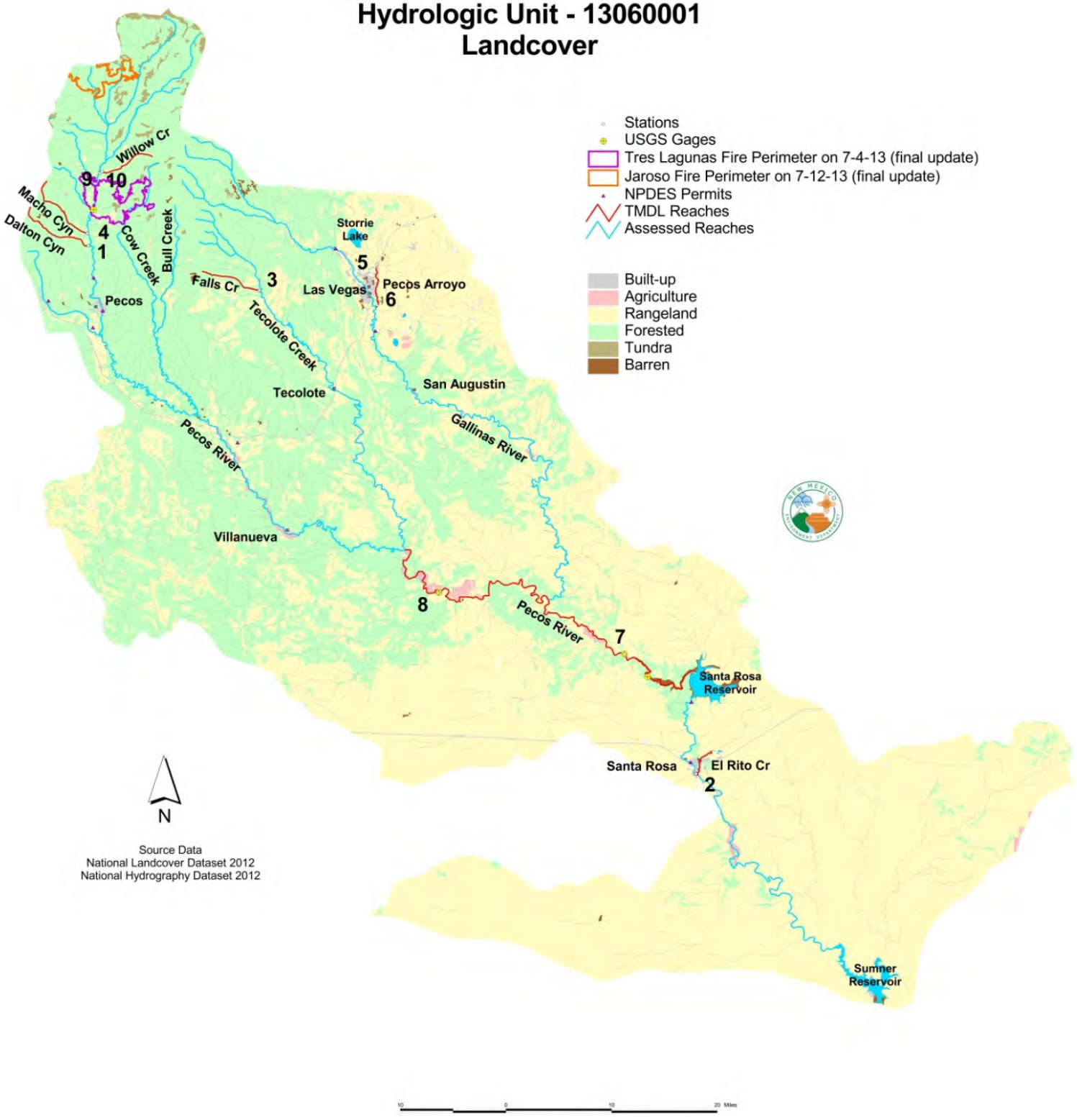
Total Personnel	1
Size	11,149 acres
Percent Contained	75%
Estimated Containment Date	Monday September 30th, 2013 approx. 10:00 AM
Fuels Involved	Mixed conifer, heavy dead and down fuels with pockets of bug-killed trees and 1,300 acres of downed timber caused by a wind event six years ago.
Fire Behavior	Widespread thunderstorms with high humidity and cloud cover have resulted in very little growth over the past week. Heavy fuels continue to burn in place. Infrared flights continue to pick up a few spot areas with minimal growth.
Significant Events	Completed the transfer of command to the Santa Fe National Forest. All resources have been released.

Outlook

Planned Actions	Will continue to monitor the fire through recon flights and Infrared flights as needed.
Growth Potential	low
Terrain Difficulty	Extreme
Remarks	The Incident Status Summary (ICS-209) in the future will continue to be updated once a week for this incident. The percentage of containment is given when firefighters have line constructed on portions of the fire's edge. On this fire because of safety considerations, no line was constructed directly on the fire's perimeter. There are sections of the fire that have shown no activity for more than four days. These areas pose no immediate threat of expanding beyond the existing fire perimeter. The containment date listed above is an estimate. Significant monsoon moisture will eventually contain and put the fire out.

version: 2.3 load time: 0.00383 sec.

Pecos Headwaters
Hydrologic Unit - 13060001
Landcover



APPENDIX F

PUBLIC COMMENTS

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SWQB hosted a public meeting in Pecos, NM on July 23, 2013 to discuss the Public Comment Draft Upper Pecos River Watershed TMDL. Notes from the public meeting are available in the SWQB Administrative Record.

Written comments received during the 30-day public comment period include:

A. Pete Tatschl, Tucumcari, New Mexico

EPA and SWQB staff provided additional editorial comments following the public comment period and corrections were made to the Final Draft TMDL as appropriate.

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From: pete & sandy [mailto:pt@plateautel.net]
Sent: Thursday, July 11, 2013 3:27 PM
To: Henderson, Heidi, NMENV
Subject: TDML on the Pecos watershed

Following the extensive fires in the upper Pecos Watershed you are having a public meeting? What for? You know the TDML is going to be off the chart and you nor anyone else can do anything about it! Quit wasting the taxpayers money on foolish meetings and planning!
Pete Tatschl
Tucumcari, NM

NMED Response: *Thank you for your comments. NMED staff understand and are sensitive to the deleterious effects that fire can have on water quality, thus TMDLs are carefully considered when they are in watersheds that were recently burned. In the case of the Upper Pecos watershed, however, the SWQB chose to continue TMDL development because the waterbodies were impaired prior to the fires and the fire perimeters did not extend into the seven watersheds discussed in the TMDL.*
The seven Assessment Units in the TMDL document were determined to be impaired based on water quality data collected during 2010, and were therefore impaired before the 2013 fires. In addition, a map of the Upper Pecos watershed that adds the Tres Lagunas and Jarosa Fire perimeters to Figure 2.1 was added to Appendix E. As noted on the map, neither fire crossed over into any of the seven impaired Assessment Units discussed in the 2013 Upper Pecos TMDL document. Additional information about the Tres Lagunas Fire was included in Sections 2.1, 6.2, and Appendix E of the Public Comment Draft of the TMDL. Similar information about the Jarosa Fire was added to the same sections of the Final Draft TMDL.
The SWQB has also developed the following website to provide the public and land management agencies with critical information regarding fire impacts on water quality:
www.nmenv.state.nm.us/swqb/Wildfire/index.html.